

Exhibit A

Streiff and Garcia
March 2, 2017

EXPERT REPORT

MICHAEL STREIFF, M.D. and DAVID GARCIA, M.D.

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March 2, 2017

GARCIA QUALIFICATION:

I am qualified to serve as an expert in this litigation because I have completed the doctor of medicine degree, internal medicine residency and hematology fellowship. Hematology is the study of blood and the blood forming organs. Blood (and its components) have several functions; I have been most interested the why the blood clots when it shouldn't. For approximately 15 years, my clinical practice, research and teaching have been focused on hematologic diseases – mainly the treatment and prevention of venous thromboembolism (VTE). VTE refers to variety of conditions, including deep vein thrombosis (DVT) and pulmonary embolism (PE), which involve the pathologic formation of clot in blood vessels that are part of the venous circulation. A main focus of my non-clinical duties has been the design, conduct and appraisal of clinical research. Over the past 20 years of practicing medicine, teaching students or trainees, and writing guidelines, I have had the occasion to review between 50 and 100 papers relevant to the safety and/or efficacy of IVC filters.

Clinical (Patient Care) Experience:

In addition to personally treating many patients with VTE, I have cared for many patients for whom inferior vena cava (IVC) filter placement was either considered or performed. Furthermore, I have treated patients who suffered from IVC filter complications, including duodenal penetration, device migration to the right atrium and acute IVC occlusion due to thrombus. I have on many occasions been part of the decision-making process in which the risks and benefits of implantation or removal of IVC filter were weighed.

Research and Scholarship Experience:

I have written book chapters and review articles on the diagnosis, treatment, and prevention of VTE. I have led or collaborated on numerous research studies related to VTE or the anticoagulant medications used to treat and prevent VTE. As referenced in the attached *curriculum vitae*, I have published peer reviewed manuscripts in numerous journals, including the New England Journal of Medicine, Blood, and Internal Medicine, Archives of Internal Medicine, Thrombosis and Hemostasis, Journal Thrombosis and Hemostasis, Thrombosis Research, Thrombosis and Thrombolysis and numerous others. I have both formally studied as well as taught the principles of evidence-based medicine and have applied these principles to the appraisal of evidence considered in the preparation of several practice guidelines that I have co-authored. I have served as a peer-reviewer of submitted manuscripts detailing studies related to thrombosis and anticoagulation for many high-impact journals, including the Lancet, the New England Journal of Medicine, Circulation, and the Annals of Internal Medicine. I am a member of the editorial board of the journal *Thrombosis Research* and I am a Special Section Editor for the journal *Blood*.

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My fee schedule for legal consultation is \$700 per hour for preparation of reports and depositions. At the time of this writing, I have received a total of approximately \$20,000 for work related to IVC filter litigation.

My current *curriculum vitae* is included in the attached Appendix A.

A list of all my legal consultations since 2005 is available in an attached as Appendix B.

STREIFF QUALIFICATION:

I am qualified to serve as an expert in this litigation because I have completed the doctor of medicine degree, an internal medicine residency and hematology/oncology fellowship. My clinical and research focus over the last 15-20 years has been the management of venous thromboembolism and anticoagulation.

Clinical Experience:

The focus of my clinical practice is the management of venous thromboembolism. As the medical director of the Johns Hopkins Anticoagulation Service since 2003, I make clinical decisions regarding the treatment of patients with venous thromboembolism including the management of anticoagulation and vena cava filters. In my Hematology clinic, I see 5-10 patients each week with venous thromboembolism and make decisions on their therapy. I attend on the inpatient Hematology service 3 months each year and see hundreds of patients annually with thrombotic and hemostatic disorders. In addition, I teach residents and fellows as well as medical students on an ongoing basis about benign hematology including management of VTE.

Clinical Research experience:

My clinical research since 2000 has focused on the management of venous thromboembolism including the appropriate use of vena cava filters. As referenced in the attached CV, I have several widely cited review articles and book chapters on vena cava filters and participated in the writing of several guidelines on management of VTE and vena cava filters. I serve as an ad hoc reviewer for a large number of journals including the New England Journal of Medicine, Blood, Thrombosis and Hemostasis and the Journal of Thrombosis and Hemostasis.

My fee schedule for legal consultation is \$600 per hour for preparation of reports and depositions. Since being retained in this class action, I have received \$6750 for reviewing materials and preparing a written report.

My current *curriculum vitae* is included in the attached Appendix C.

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A list of all my legal consultations since 2005 is available in an attached as Appendix D.

Undiagnosed venous thromboembolism (VTE) is a common cause of morbidity and mortality in the United States. The annual incidence of VTE has been estimated to be 104-183 per 100,000 among Caucasian or European ethnicity.¹ First line therapy for prevention and treatment of VTE is anticoagulation. This conclusion is supported by the results of numerous randomized controlled trials.² Vitamin K antagonists such as warfarin and direct oral anticoagulants such as apixaban, dabigatran, edoxaban and rivaroxaban have been associated with a small risk of recurrent VTE (2-3%) and major bleeding (1-2%) over the initial 6 months of therapy.^{2,3}

Risk-benefit of IVC Filters in the TREATMENT of Venous Thromboembolism.

A minority of patients have a contraindication that precludes anticoagulation. In these patients, vena caval filters represent an important therapeutic option. The only widely accepted indication for IVC filter placement is a contraindication to anticoagulation in a patient with acute (within 1 month) proximal deep venous thrombosis and or pulmonary embolism. Since the risk of recurrent VTE is substantially lower in patients with less acute DVT (10% during months 2-3), use of IVC filters in this patient population is likely to be associated with less attractive risk: benefit balance particularly if the contraindication to anticoagulation is temporary.^{2,4}

The efficacy of IVC filters is based primarily upon two randomized controlled trials, PREPIC and PREPIC2.⁵⁻⁷ In the PREPIC study, 400 patients with proximal DVT with or without PE at high risk for PE were randomly assigned to receive a permanent only VCF plus anticoagulation or no filter in addition to with only anticoagulation therapy. Surveillance ventilation/perfusion scans were performed at baseline and after 8 to 12 days of anticoagulation. Ninety-four percent were treated with anticoagulation only for at least 3 months and thirty-eight percent were still on oral anticoagulation at 2 years, and 35% received anticoagulation over the entire 8-year follow-up. After 12 days of therapy, those with combination therapy consisting of filters plus anticoagulation were associated with a significant decrease in symptomatic and asymptomatic PE compared with anticoagulation alone (1.1% vs. 4.8%; $P = .03$). When only symptomatic PE was considered, the difference between the filter and no filter groups was no longer significant (1.0% vs. 3.0%). At 2 years, symptomatic PE tended to be less frequent among filter plus anticoagulation recipients than those receiving anticoagulation alone (3.0% vs. 6.0%, $P=0.16$), a statistically non-significant difference. However, the VCF plus anticoagulation group were associated with significantly more recurrent DVT than was observed with anticoagulation alone (21.0% vs. 12.0%; $P = .02$). No difference in bleeding or mortality was noted.⁵ At 8 years, outcome data on 99% of patients were available, and 198 patients (50%) were still alive. The occurrence of symptomatic PE was less frequent in the filter plus anticoagulation group recipients than in those treated with anticoagulation alone (6.0% vs. 15.0%; $P = .008$). DVT was more frequent among filter patients with a filter plus anticoagulation therapy. (36.0% vs. 28.0%; $P = .042$). Fifty percent of PEs and 65% of DVT occurred during the first 2 years of follow-up.

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Symptomatic filter thrombosis occurred in 13% after 8 years. Post-thrombotic syndrome (PTS) was observed in 70% of patients in both the filter and no filter groups. No difference in overall survival was reported.⁶

The lower rate of PE in the group assigned to receive a filter plus anticoagulation has been cited as evidence of the benefit of IVC filters. However, as the authors acknowledge: “the diagnosis of pulmonary embolism may have been underestimated in patients in the filter group, because local clinicians tend to suspect pulmonary embolism less frequently in patients with a filter than in patients without a filter” (this is a key flaw of un-blinded clinical trials known as ascertainment bias). Therefore, the conclusion that IVC filter insertion lowers the risk of PE has not been definitively established by this non-blinded study. Any conclusion from PREPIC about the effect of IVC filters on the risk of PE is further limited by the fact that, at any given time, 30 – 50% [I thought both study groups received anticoagulation] of patients in both study groups were receiving anticoagulation, an intervention known to dramatically reduce the risk of pulmonary embolism. The fact that this key variable was not controlled for (and may have impacted PE rates differently in the 2 groups) makes it impossible to conclude with certainty that any observed difference in PE rates is attributable to the IVC filter placement.

PREPIC2 randomized 399 hospitalized patients with acute PE and lower extremity DVT to receive a retrievable filter plus anticoagulation (filter group) or not in addition to anticoagulation only (anticoagulation group).⁷ All patients received anticoagulation for at least 6 months. The primary efficacy outcome was symptomatic recurrent pulmonary embolism at 3 months. Secondary outcomes were recurrent pulmonary embolism at 6 months, symptomatic deep vein thrombosis, major bleeding, death at 3 and 6 months, and filter complications. By 3 months, pulmonary embolism had recurred in 6 patients in the filter group (3.0% [95%CI, 1.1% to 6.5%]) and 3 patients in the anticoagulation control group (1.5% [95%CI, 0.3% to 4.3%]) (relative risk with filter, 2.00 [95% CI, 0.51 to 7.89]; P = .50) (Table 3). The absolute difference in risk was +1.50 percentage points (95%CI, -1.4 to 4.4). All episodes of pulmonary embolism in the filter group and 2 of 3 in the anticoagulation control group were fatal. One additional pulmonary embolism recurrence was observed in each group between 3 and 6 months. No difference between the filter and anticoagulation control groups was seen in recurrent deep vein thrombosis, major bleeding or death. In patients with acute pulmonary embolism and proximal lower extremity DVT, these results indicate that anticoagulation therapy alone does reduce the risk of pulmonary embolism but retrievable filters do not reduce that the risk of recurrent PE when added to anticoagulation in patients with acute PE and proximal lower extremity DVT.⁷

Risk-benefit of IVC Filters in the PREVENTION of (prophylaxis against) Venous Thromboembolism.

No adequately powered, prospective, randomized trial of IVC filters as VTE prophylaxis (i.e. among patients who are at high risk for, but have not experienced, VTE) exists. The relevant published data on prophylactic IVC filter placement have been recently reviewed by Davies et al.

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The authors found no high-quality evidence to support prophylactic IVC filter placement in any patient group and we agree with their conclusion that “widespread use of prophylactic IVC [filters] is not supported by evidence and should be discouraged.”⁸

The feasibility and ethical nature of a prospective randomized trial comparing IVC filter placement to no IVC filter placement as a primary prevention of PE in patients with major trauma has been demonstrated by Rajasekhar and colleagues.⁹ Although this feasibility study showed that a larger randomized trial of IVC filter vs. no filter (as primary PE prophylaxis in trauma patients) could be done, no such trial has been performed (and the benefit of filters as a primary prevention strategy remains unproven).

We recognize that a number of observational studies of IVC filters have been published, with inconsistent results. In the end, no conclusions about the relative safety or efficacy of any treatment or prevention strategy can or should be drawn from observational comparative studies; the validity of observational comparisons is limited by the potential for *selection bias* (the possibility that treating clinicians may consciously or unconsciously select different types of patients for a particular treatment) and by the possibility of *confounding variables* (differences in the comparison groups that may impact safety or efficacy outcomes, but are separate from the intervention being studied). We have reviewed many observational studies relevant to IVC filters and we have the expertise to discuss and appraise the methodology of such studies.

The existing literature supports the use of vena cava filters in one setting: acute venous thromboembolism with a contraindication to anticoagulation. High-quality evidence suggests IVC filters should not be used in patients able to receive anticoagulation, even if they are considered to be at high risk for recurrent PE. There are insufficient data to establish that IVC filters have more benefit than risk: (1) in patients who fail anticoagulation and (2) in patients with major trauma or undergoing bariatric surgery in need of thromboprophylaxis.

Physician Expectations.

The tolerance for risk related to IVC filters should be extremely low because:

- (1) Questions remain as to whether they are effective in achieving their intended goal: reducing mortality due to pulmonary embolism.
- (2) There is high-quality evidence that, in some instances, IVC filters increase the risk of venous thrombosis (especially vena caval thrombosis and lower extremity DVT).
- (3) Well-designed, adequately powered clinical studies that demonstrating the long-term safety of IVC filters do not exist.

Thus, in order for physicians to make reasonable risk-benefit assessments regarding filters, it is critically important that manufacturers of IVC filters continuously apprise the clinicians who order and implant IVC filters about their safety profile, performance characteristics, design problems, and internal risk assessments. In addition filter manufacturers have a key obligation to

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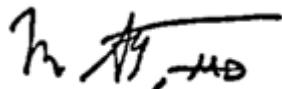
report the experiences of other physicians who have reported serious complications, as well as any available relevant inter-device comparisons or emerging studies that compare IVC filter implantation to other management strategies. In other words, in order for physicians (and ultimately patients) to properly assess the risks versus the benefits of IVC filters (along with other available therapies), it is our opinion that Bard's complete transparency about the safety profile of its IVC filters is paramount. We share the sentiments of Bard's former director of regulatory affairs that: "Transparency in matters that affect patient safety should be embraced as a primary corporate obligation." (Ganser deposition Oct 11, 2016 (89:7-9)).

Respectfully submitted,



March 2, 2017

DAVID GARCIA, M.D.



March 2, 2017

MICHAEL STREIFF, M.D.

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Addendum:

Since preparing this literature summary, we have had the opportunity to read Dr. David Kessler's report based upon his review of documents relevant to the ongoing national litigation and medical monitoring class action suit against Bard. The data provided in his summary lead us to the following conclusions:

1. Bard mislead the FDA on the tendency of the Recovery filter to migrate when challenged by increased venous pressure. They represented to others and used an inappropriate minimum safety threshold and performance specification in their stability/migration in vitro studies that the maximal venous pressure was 35 mmHg from a literature review when their own animal experimental data suggested that pressure up to 69 mmHG could be generated. In addition their own experimental testing demonstrated that the Recovery Nitinol filter (RNF) migrated at significantly lower venous pressure than the selected predicate device, the Simon Nitinol filter (SNF), the device they claimed was being replaced by and inferior to RNF
2. These findings in "laboratory" tests of failed or significantly lower migrations resistance was borne out in a pilot study to test retrievability conducted by Dr. Murray Asch in Canada in 2000. In the first 11 patients who received the RNF, one experienced a significant (4 cm) migration toward the heart when challenged by a clot. Fortunately, the patient was in a clinical trial, being closely monitored, and scheduled for removal of the device when this migration was discovered.
3. In light of these test results and the experience in the Asch retrievability pilot study (which also experienced fractures in 2 different locations in the same patient) Bard should not have marketed the filter since its performance was significantly poorer than the comparator, was not performing as intended, expected and represented prior to marketing and failed safety thresholds for migration that were likely to be encountered when implanted in human beings.
4. The results of these pre-market investigations were predictive of the subsequent clinical experience with the RNF after-market release. The RNF was associated with statistically significant more complications and especially fatalities from the embolization of the device to patient's hearts when clot challenged. The rates of filter migration and migration-related death were significantly higher for the Recovery filter compared to the SNF, the predicate comparator device, and a number of other competitive devices. Bard knew this from an internal statistical analysis performed after both the first and second embolization deaths that occurred less than four months after their official marketing launch in January 2004.

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5. Dr. Kessler also noted that perforation, filter fracture and tilting were significantly more common with the RNF than the SNF. Internal documents quoted in Dr. Kessler's report confirm that Bard knew of these deficiencies with the RNF but continued to market the device. Similar defects were noted during testing of the replacement filter for the RNF, the G2 filter, as well as the G2 replacement, Eclipse. In experimental testing it failed to meet the pre-specified standard of resistance to migration of greater than or equal to the SNF, so Bard changed and lowered the performance standard in order to exceed the performance of the RNF from the SNF. Testing also revealed that the G2 (and thus the Eclipse which relied on G2 testing for migrations) and RNF had a greater propensity to caudal migration than the Gunther-Tulip filter (a commercially available retrievable filter) and the Greenfield filter.
6. Similar to the experience with the RNF, the performance deficiencies of the G2 filter were replicated after its clinical market release. Dr. Betensky's analysis of adverse event reports found that the G2 filter was significantly more likely to experience migration, caval perforation, filter fracture and tilting than the SNF.
7. The cumulative data in Dr. Kessler's report indicate that Bard knew that the RNF, G2 family and the Eclipse filters did not fulfill their own internal performance standards and would pose an increased risk for adverse events to patients. Despite this knowledge and accumulating clinical data regarding disproportionate adverse events and serious injuries Bard continued to market the devices putting innocent patients at risk for harm.

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References.

1. Heit JA. Epidemiology of venous thromboembolism. *Nat Rev Cardiol.* 2015;12(8):464-474.
2. Kearon C, Akl EA, Ornelas J, et al. Antithrombotic Therapy for VTE Disease: CHEST Guideline and Expert Panel Report. *Chest.* 2016;149(2):315-352.
3. Gomez-Outes A, Terleira-Fernandez AI, Lecumberri R, Suarez-Gea ML, Vargas-Castrillon E. Direct oral anticoagulants in the treatment of acute venous thromboembolism: a systematic review and meta-analysis. *Thromb Res.* 2014;134(4):774-782.
4. Rajasekhar A and Streiff MB. Vena cava filters for management of venous thromboembolism: a clinical review. *Blood Rev.* 2013;27(5):225-241.
5. Decousus H, Leizorovicz A, Parent F, et al. A clinical trial of vena caval filters in the prevention of pulmonary embolism in patients with proximal deep-vein thrombosis. Prevention du Risque d'Embolie Pulmonaire par Interruption Cave Study Group. *N Engl J Med.* 1998;338(7):409-415.
6. PREPIC Study Group. Eight-year follow-up of patients with permanent vena cava filters in the prevention of pulmonary embolism: the PREPIC (Prevention du Risque d'Embolie Pulmonaire par Interruption Cave) randomized study. *Circulation.* 2005;112(3):416-422.
7. Mismetti P. PREPIC 2: Interruption of Inferior Vena Cava by a Retrievable Filter for the Prevention of Recurrent Pulmonary Embolism: a Randomized, Open Label Study. ;2012(7/7).
8. Davies MG et al. *J Vasc Surg Venous Lymphat Disord* 4 (1), 127-130.e1. 2015 Jul 16.
9. Rajasekhar A et al. *J Trauma.* 2011 Aug;71(2):323-8.

APPENDIX A

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CURRICULUM VITAE**DAVID A. GARCIA, MD****PERSONAL DATA**

Place of Birth: St. Louis, Missouri
Citizenship: United States
Date of Birth: May 5, 1967

EDUCATION

1985 – 1989 B.A., Physics, *magna cum laude*, Duke University, Durham, North Carolina
1989 – 1993 M.D., University of Alabama School of Medicine, Birmingham, Alabama

POSTGRADUATE TRAINING

1993 – 1996 Intern and Resident in Internal Medicine, John Hopkins Hospital, Baltimore, Maryland
2012 – 2013 Fellowship in Hematology, University of Washington, Seattle, Washington

FACULTY POSITIONS HELD

1998 – 1999 Acting Instructor of Medicine, Johns Hopkins Hospital, Baltimore, Maryland
1999 – 2008 Assistant/Associate Professor of Medicine, University of New Mexico, Albuquerque, New Mexico
2008 – 2012 Associate Professor of Medicine, University of New Mexico, Albuquerque, New Mexico
2012 Professor of Medicine, University of New Mexico, Albuquerque, New Mexico
2013 – Present Professor of Medicine, University of Washington, Seattle, Washington

HOSPITAL POSITIONS HELD

1996 - 1998 Hospitalist, Mid-Atlantic Permanente Medical Group at Holy Cross Hospital, Silver Spring, Maryland

CURRENT EMPLOYMENT

(N/A)

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HONORS

1988	Phi Beta Kappa, Duke University, Durham, North Carolina
1992	Alpha Omega Alpha, University of Alabama School of Medicine, Birmingham, Alabama
1996	House-staff Teaching Award, Johns Hopkins Hospital, Baltimore, Maryland
2005	DoIM Faculty Teaching Award, University of New Mexico, Albuquerque, New Mexico

BOARD CERTIFICATION

Year Initially Certified	Internal Medicine (since 2006)
Year Initially Certified	Hematology (since 2014)

CURRENT LICENSE(S) TO PRACTICE

2012 – Present	State of Washington; No. MD60303090; Expires April 5, 2017
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PROFESSIONAL ORGANIZATIONS

Year Started	Member, American Society of Hematology (since 2002)
Year Started	Member, International Society of Thrombosis and Hemostasis (since 2001)

TEACHING RESPONSIBILITIES*a) Courses:*

2010 – 2012	Tutorial Group Faculty Leader, Evidence-based Medicine Course, University of New Mexico
2012 – 2014	Faculty Member, ASH Clinical Research Training Institute
2014 – Present	Assistant Course Director, Hematology Course (2nd Year Medical Students), University of Washington

b) CME Lectures:

2015	“The New Oral Anticoagulants: An Update,” Grand Rounds, Mayo Clinic, Scottsdale, Arizona, January 24 – 25, 2015.
2015	“Thrombosis and Anticoagulation,” 2015 Highlights of ASH in North America, Seattle, Washington, January 30 – 31, 2015.
2015	“Practical Considerations for the NOACS,” ASH Review, University of Colorado, Loveland, Colorado, February 6, 2015.
2015	“Stroke Prevention in AF: An Update,” ACC Washington State Chapter Meeting, Seattle, Washington, February 7, 2015.

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- 2015 "Practical Considerations for the NOACs," University of Washington Internal Medicine Grand Rounds, Seattle, Washington, April 16, 2015.
- 2015 "An Update in Thrombosis and Anticoagulation," 2015 Highlights of ASH in Latin America, Cartagena, Colombia, April 20 – 25, 2015.
- 2015 "Duration of Anticoagulation for Patients with APLA: A Debate," 20th Congress of the European Hematology Association, Vienna, Austria, June 8 – 15, 2015.
- 2015 "Practical Considerations for the NOACs," Harrison Hospital, Bremerton, Washington, August 1, 2015.
- 2015 "An Update in the Treatment of Venous Thromboembolism," What's New in Medicine 2015, Kennewick, Washington, September 11 – 12, 2015.
- 2015 "The Direct Oral Anticoagulants: Practical Considerations," Henry Ford Hospital Hematology-Oncology Grand Rounds, Detroit, Michigan, October 2015.
- 2015 "Peri-Procedural Anticoagulation: Where Do We Stand in 2015?," 8th Annual International Symposium on Thrombosis and Anticoagulation (ISTA) Conference, Sao Paulo, Brazil, October 22 – 25, 2015.
- 2015 "An Update in the Treatment of Venous Thromboembolism," 2015 Primary Care Update, (Interstate Postgraduate Medical Association) Kissimmee, Florida, November 9 – 10, 2015.
- 2016 "Venous Thromboembolism & Anticoagulation: 2016 Update," Scripps' 36th Annual Conference: Clinical Hematology & Oncology, San Diego, California, February 13, 2016.
- 2016 "Antiphospholipid Antibodies," Scripps' 36th Annual Conference: Clinical Hematology & Oncology, San Diego, California, February 13, 2016.
- 2016 "Meet the Professor Breakout Session: Confusing Cases in Coagulation," Scripps' 36th Annual Conference: Clinical Hematology & Oncology, San Diego, California, February 13, 2016.
- 2016 "Direct oral Anticoagulants in Special Populations," Antithrombotic Symposium at Hurley Medical Center, Dearborn, Michigan, April 7, 2016.
- 2016 "Common Indications for Anticoagulation: A Primer for the Advanced Practice Provider," Anticoagulation Forum Mini Boot Camp at the 2016 Thrombosis and Hemostasis Summit of North America (THSNA), Chicago, Illinois, April 13, 2016.
- 2016 "Bridging Between DOACs and other Anticoagulants," 2016 Thrombosis and Hemostasis Summit of North America (THSNA), Chicago, Illinois, April 14, 2016.
- 2016 "Cancer Associated Thrombosis – An Update for the Clinician," Winship Cancer Institute Grand Rounds, Atlanta, Georgia, August 17, 2016.

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- 2016 "The Direct Oral Anticoagulants: Practical Considerations," ASH Consultative Hematology Conference, Chicago, Illinois, September 15, 2016.
- 2016 "General Review of Direct Oral Anticoagulants (DOACs)," 15th International Congress on antiphospholipid Antibodies, Cyprus, Greece, September 21-24, 2016.
- 2016 "Can We Stop Anticoagulation in APS Patients with Previous Thrombosis?," 15th International Congress on antiphospholipid Antibodies, Cyprus, Greece, September 21-24, 2016.
- 2016 "DOACs: Practical Considerations and Advances on Their Reversal," XII Argentine Congress on Haemostasis and Thrombosis, Buenos Aires, Brazil, September 28 – October 1, 2016.
- 2016 "HIT: Institutional Optimization of Diagnosis and Management, DOACs Role in the Therapeutics," XII Argentine Congress on Haemostasis and Thrombosis, Buenos Aires, Brazil, September 28 – October 1, 2016.
- 2016 "Is Prolonged Anticoagulation Recommended After the First Thrombotic Event in Patients with Antiphospholipid Antibodies," XII Argentine Congress on Haemostasis and Thrombosis, Buenos Aires, Brazil, September 28 – October 1, 2016.
- 2016 "Direct Oral Anticoagulants for Treatment of Venous Thromboembolism: Practical Issues," XII Argentine Congress on Haemostasis and Thrombosis, Buenos Aires, Brazil, September 28 – October 1, 2016.
- 2016 "Measuring the Effect of New Anticoagulants: Do the Traditional Tests Work?" IX International Symposium of Thrombosis and Anticoagulation, Salvador, Brazil, October 13-17, 2016
- 2016 "Anticoagulation in Patients with Cancer and/or Inherited Coagulopathies: An Update," IX International Symposium of Thrombosis and Anticoagulation, Salvador, Brazil, October 13-17, 2016
- 2016 "The Direct Oral Anticoagulants: Practical Considerations," ISTH Advanced Training Course in Thrombosis and Hemostasis, Atlanta, Georgia, November 1-4, 2016.
- 2016 "Antiphospholipid Syndrome," ISTH Advanced Training Course in Thrombosis and Hemostasis, Atlanta, Georgia, November 1-4, 2016.
- 2016 "The Direct oral Anticoagulants: Practical Considerations," Washington Chapter – ACP Annual Meeting, Seattle, Washington, November 10-12, 2016.
- 2016 "Clinical Benign Hematology Careers," Careers Development Lunch, 59th ASH Annual Meeting & Exposition, San Diego, California, December 3, 2016.
- 2016 "Systems-Based Hematology: A New Career path for Hematologists," 59th ASH Annual Meeting & Exposition, San Diego, California, December 4, 2016.

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2016 "The Direct Oral Anticoagulants: Practical Considerations," ASH Consultative Hematology Conference, San Diego, California, December 5, 2016.

EDITORIAL RESPONSIBILITIES

2003 – Present	Editorial Board Member, Thrombosis Research
2009 – 2014	Associate Editor, ACP Journal Club
2013 – Present	Editorial Board Member, Journal of Thrombosis and Haemostasis
2014 – 2016	Contributing Editor, <i>The Hematologist</i>
2014 – Present	Special Section Editor, <i>Blood</i>

SPECIAL NATIONAL RESPONSIBILITIES

2007 – 2013	President, Anticoagulation Forum
2007 – Present	<i>Ex officio</i> Member, Board of Directors of Anticoagulation Forum
2012	Chairman of the Inaugural Thrombosis and Hemostasis Summit of North America (Chicago)
2012 – Present	Secretary, National Association for Thrombosis and Hemostasis
2014	Co-Chair, Thrombosis and Hemostasis Summit of North America (Chicago)
2014 – Present	<i>Ex officio</i> Member, Board of Directors of Thrombosis and Hemostasis Societies of North America
2014 – Present	Member, ASH CRTI Oversight Committee
2016	Vice-Chairman, ASH Scientific Program Sub-committee on Thrombosis and Vascular Biology
2017	Chair, ASH Scientific Committee on Thrombosis & Vascular Biology

SPECIAL LOCAL RESPONSIBILITIES

2000 – 2007	Medical Director, Inpatient Internal Medicine University of New Mexico Hospital
2006 – 2008	Director, Undergraduate Medical Education Department of Internal Medicine University of New Mexico Health Sciences Center
2013 – Present	Medical Director, Antithrombotic Therapy University of Washington Medical Center
2013 – Present	Assistant Course Director, Hematology Course for 2nd-year students, University of Washington School of Medicine
2015 – Present	Seattle Cancer Care Alliance Clinical Operations Disease Group Leader: Cellular Hematology + Thrombosis and Hemostasis

January 2017

RESEARCH FUNDING*a) Current:*

Industry-sponsored clinical trials at the University of Washington and Seattle Cancer Care Alliance (amount unknown)

b) Past:

Principal Investigator for approximately 10 clinical trials (sponsored by industry, NHLBI, CIHR) between 2001 and 2012 (total funding paid to the University of New Mexico: approximately \$500,000).

BIBLIOGRAPHY*a) Manuscripts in Refereed Journals (* - denotes the five most significant publication)*

1. Libby E, **Garcia, D.** A survey of Vitamin K use by anticoagulation clinics. *Arch Int Med.* 162(16): 1893-189; 2002 [Original Work]
2. **Garcia D**, Ageno W, Libby E, Bibb J, Douketis J, Crowther M. Perioperative anticoagulation for patients with mechanical heart valves: a survey of current practice. *J Thromb Thrombolysis.* 18(3): 199-203; 2004 [Original Work]
3. Ageno W, **Garcia D**, Libby E, Crowther M. Managing oral anticoagulant therapy in patients with mechanical heart valves undergoing elective surgery: results of a survey conducted among Italian physicians. *Blood Coagul Fibrinolysis* 15:623-628; 2004 [Original Work]
4. **Garcia D**, Libby E, Rich JS. Perioperative anticoagulation for patients with mechanical heart valves: a model comparing unfractionated and low molecular weight heparin. *J Clin Outcomes Management* 12:25-32; 2005 [Original Work]
5. Oh D, Kim S, Lim CY, Lee JS, Park S, **Garcia D**, Crowther MA, Ageno W. Perioperative anticoagulation in patients with mechanical heart valves undergoing elective surgery: results of a survey conducted among Korean physicians. *Yonsei Med J.* 46(1):66-72; 2005 [Original Work]
6. **Garcia D**, Regan S, Crowther M, Hughes R, Hylek E. Warfarin maintenance dosing patterns in clinical practice: implications for safer anticoagulation in the elderly population. *Chest.* 127:2049-2056; 2005 [Original Work]
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97. Samuelson BT, Cuker A, Siegal DM, Crowther M, **Garcia DA**. Laboratory Assessment of the Anticoagulant Activity of Direct Oral Anticoagulants: A Systematic Review. *Chest.* 2017 Jan;151(1):127-138. doi: 10.1016/j.chest.2016.08.1461. PubMed PMID: 27637548. [Original Work]

b) Book Chapters

1. **Garcia D.**, Crowther M., "Deep Vein Thrombosis.: *Hospital Medicine* , 2nd Edition, Ed. Robert M. Wachter, Ed. Lee Goldman, Ed. Harry Hollander. Lippincott, Williams and Wilkins, 2005. Print.
2. **Garcia D.**, Cohen J., Burnett A. "Hemorrhagic Complications of Anticoagulants in Hospitalized Patients." *Inpatient Anticoagulation*, 1st Edition, Ed. Margaret Fang. Hoboken: Wiley-Blackwell, 2011. Print.
3. **Garcia D.**, MacIndoe C. "Venous Thromboembolism in the Neurologic Intensive Care Unit." *Textbook of Neurointensive Care*, Ed. Joseph Layon, Ed. Andrea Gabrielli, Ed. William Friedman. London: Springer, 2013. 343-353. Print.
4. **Garcia, David A.** and Samuelson, Bethany T. "Managing acute vascular events in patients with myeloproliferative neoplasms." *Managing Myeloproliferative Neoplasms: A Case-Based Approach*, Ed. Ruben A. Mesa, Ed. Claire N. Harrison. Cambridge: Cambridge University Press, 2016. 160-171. Print.
5. **Garcia D.**, Crowther M., Ageno W., "The Direct Oral Anticoagulant." *Practical Hemostasis and Thrombosis*, 3rd Edition. Ed. Nigel S. Key, Ed. Michael Makris, Ed. David Lillicrap, Oxford: Wiley & Sons, Ltd. 2017. 253-268. Print.
6. **Garcia DA**. Hemorrhagic complications of anticoagulants in hospitalized patients. Chapter in *Inpatient Anticoagulation*, First Edition Wiley-Blackwell – Editor, Fang; 2011
7. **Garcia D**, Middledorp S, Sharathkumar A. Thrombosis and Thrombophilia. *American Society of Hematology Self-assessment Program*. 2016 (Steensma and Cuker, Eds.)
8. Samuelson, B. **Garcia D**. Thromboembolism in Myeloproliferative Neoplasms – in press

c) Published Books, Videos, Software, etc.

1. Antiplatelet and Anticoagulation Therapy. Ferro A and **Garcia D**. Editors. 1st Edition. 2013. ISBN: 978-1-4471-4296-6 (Print).

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d) Other publications

1. **Garcia D.** Commentary on: Below-knee elastic compression stockings reduced development of the post-thrombotic syndrome in proximal deep venous thrombosis. *ACP J Club.* 142(1):7, 2005 [Editorial]
2. Ageno W, Squizzato A, **Garcia D**, Imberti D. Epidemiology and risk factors of venous thromboembolism. *Semin Thromb Hemost.* 32(7):651-8, 2006 [Review]
3. **Garcia D**, Hylek E. Antithrombotic Therapy in Atrial Fibrillation. *Clin Geriatr Med.* 22(1):155-66; 2006 [Review]
4. **Garcia D**, Hylek E. Commentary on: Development of a contemporary bleeding risk model for elderly warfarin recipients. *ACP J Club.* 146(2):52; 2007 [Editorial]
5. **Garcia D**, Spyropoulos A. Update in the treatment of venous thromboembolism. *Semin Respir Crit Care Med.* 29:40-46, 2008 [Review]
6. **Garcia D**, Hylek E. Reducing the risk for stroke in patients who have atrial fibrillation. *Cardiol Clin.* 26:267-275, 2008 [Review]
7. **Garcia D.** Duration of anticoagulant therapy for patients with venous thromboembolism. *Thromb Res.* 123 Suppl 1:S62-4, 2008 [Review]
8. **Garcia D.** Warfarin and pharmacogenomic testing: the case for restraint. *Clin Pharmacol Ther.* 84(3):303-5, 2008 [Editorial]
9. **Garcia D.** ACP Journal Club. Review: D-dimer levels predict risk for recurrent VTE after anticoagulant therapy is stopped. *Ann Intern Med.* 150(4):JC2-14, 2009 [Editorial]
10. **Garcia D**, Hylek E. Warfarin pharmacogenetics. *N Engl J Med.* 360(23):2474, 2009 [Letter to the Editor]
11. **Garcia D.** Novel anticoagulants and the future of anticoagulation. *Thromb Res.* 123 Suppl 4:S50-5. Review, 2009 [Review]
12. **Garcia DA.** Rethinking warfarin reversal. *Blood.* 116(5):675-6, 2010 [Editorial]
13. **Garcia DA.** Current therapeutic strategies and future perspectives for the treatment of venous thromboembolism. *Curr Pharm Des.* 16(31):3475, 2010 [Review]
14. **Garcia DA**, Granger CB. Anticoagulation, novel agents, and procedures: can we pardon the interruption? *Circulation.* 126(3):255-7, 2012 [Editorial]
15. **Garcia D.** ACP Journal Club. After a first proximal DVT, compression stockings did not prevent the post-thrombotic syndrome. *Ann Intern Med.* Apr 15; 160(8):JC7. 2014 [Editorial]
16. **Garcia D.** VTE risk and family history: provocative findings. *Blood.* Sep 25; 124(13):2011. 2014. [Editorial]

e) Abstracts

1. Li A, Davis C, Wu Q, Kesten MF, Gopal AK, **Garcia DA**. "Management of Anticoagulation in Patients with Hematologic Malignancy Undergoing Autologous Hematopoietic Cell Transplantation." ASH Annual Meeting Abstracts. December 2016.

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Other*a) Other Invited Lectures (see also CME lectures under TEACHING RESPONSIBILITIES on page 2)*

1. "The Vitamin K Antagonists in 2010 – an Update" October 2010; International Symposium on Thrombosis and Anticoagulation, São Paulo, Brazil.
2. "Personalized Medicine: Pharmacogenomics of Clopidogrel and Warfarin". December 2010; American Society of Hematology Annual Meeting, Orlando, FL
3. "Thrombosis and Anticoagulation". January 2011; Highlights of ASH North America, San Diego, CA
4. "Thrombosis and Anticoagulation". April 2011; Highlights of ASH Latin America, Punta Del Este, Uruguay.
5. "Cancer-Associated Thrombosis". September 2011; McMaster University: Symposium on Thromboembolism, Hamilton, ON, Canada
6. "A Debate on Bleeding Risk Models". October 2011; International Symposium on Thrombosis and Anticoagulation, Salvador, Brazil
7. "The New Oral Anticoagulants". November 2011; Stanford University School of Medicine: Safe Management of Anticoagulation Therapy, Palo Alto, CA
8. "The Future of Anticoagulation". November 2011; Mayo Clinic Internal Medicine Grand Rounds, Scottsdale, AZ
9. "The Future of Anticoagulation". January 2012; University of Washington Hematology Grand Rounds, Seattle, WA.
10. "The Future of Anticoagulation". March 2012; Johns Hopkins University Internal Medicine Grand Rounds, Baltimore, MD.
11. "Cancer and Venous Thromboembolism" April 2012; Curso Internacional de Avances en Trombosis y Hemostasia, Pontificia Universidad Católica de Chile, (Santiago).
12. "The Pharmacology of the New Anticoagulants". April 2012; American College of Physicians Annual Meeting, New Orleans, LA.
13. "Changes to the ACCP Guidelines on the Prevention of VTE after Non-Orthopedic Surgery" June 2012; Groupe Interdisciplinaire Trousseau sur les Antithrombotiques, Paris, France.
14. "What's New in Bleeding and Clotting Disorders" August 2012; Mayo Clinic Hematology/Oncology Review Course, Amelia Island, FL.
15. "An Update in Cancer and Thrombosis" October 2013; Grupo Cooperativo Latino Americano de Hemostasia y Trombosis, Cancún, Mexico.
16. "Urgent Surgery with the Novel Anticoagulants" November 2013; American Heart Association Annual Meeting, Dallas, Texas.
17. "Evidence-based Practice Guidelines: Balancing Rigor with User-friendliness" December 2013; American Society of Hematology Annual Meeting, New Orleans, LA.
18. "An Update on the Targeted Oral Anticoagulants" June 2014; Internal Medicine Grand Rounds Memorial Sloan Kettering Cancer Center, New York, New York.

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19. "Treatment of Bleeding and Thromboembolism: The Old and the New" October 2014; International Symposium on Thrombosis and Anticoagulation, São Paulo, Brazil.
20. "The Target Specific Anticoagulants" November 2014, Brazilian Congress of Hematolgy and Hemotherapy, November 2014, Florianopolis, Brazil.
21. Skating on thin ice with Blood Thinners" December 2014, American Society of Hematology Annual Meeting, San Francisco, CA.

APPENDIX B

Case	State	Date	Activity (Location)	Retained By
Scheffer adv. Fisher and Roberts	KS	Jan. 2013	Deposition (Albuquerque, NM)	Daniel Giroux
Steadman adv. Oropeza	FL	June 2014	Deposition (Seattle, WA)	McMillen Law Firm
Steadman adv. Oropeza	FL	Sept. 2014	Trial testimony	McMillen Law Firm
Josefson adv. Northwestern University Medical Center	IL	Apr. 2015	Deposition (Seattle, WA)	Patrick Vezino (Baker & Enright)
Kuehn adv. Gaiha et al.	IL	July 2015	Deposition (Seattle, WA)	Timothy Richardson
Scheffer adv. Fisher and Roberts	KS	Sept. 2015	Trial Testimony	Daniel Giroux
Lurix adv. Goodell	NM	Dec. 2016	Deposition (Seattle, WA)	William Winter
Miceli adv. State of Connecticut	CT	Feb. 2017	Deposition (Seattle, WA)	Joshua Koskoff

APPENDIX C

CURRICULUM VITAE FOR ACADEMIC PROMOTION
The Johns Hopkins University School of Medicine

DEMOGRAPHIC INFORMATION

Current Appointments

University:

- 2008-present Associate Professor, Department of Medicine, Johns Hopkins
2012-present Associate Professor, Department of Pathology, Johns Hopkins
2012-present Associate Faculty, Armstrong Institute for Patient Safety and Quality

Hospital:

- 1997-present Attending Physician, The Johns Hopkins Hospital
2000-present Medical Director, The Johns Hopkins Hospital Special Coagulation Laboratory
2000-present Attending Physician, The Johns Hopkins Hospital Comprehensive Hemophilia Treatment Center

Other:

- 2009-present Chairman, Venous Thromboembolism Guidelines Committee, National Comprehensive Cancer Network
2013-present Board Member, Anticoagulation Forum
2014-present President, Medical and Scientific Advisory Board, National Blood Clot Alliance

Personal Data:

Hematology
Medicine
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1830 E. Monument Street
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410-502-8642
410-614-8601
mstreif@jhmi.edu

Education and Training (in chronological order)

Undergraduate

- 1983 B.S., Biology, Washington and Lee University, Lexington VA

Graduate/Doctoral

- 1984 Fulbright Scholar, Biochemistry, University of Ulm, Germany
1988 M.D., Medicine, Johns Hopkins University, Baltimore, MD

Postdoctoral

- 1988-1989 Intern, Medicine, University of Florida, Gainesville, FL
1989-1991 Resident, Medicine, University of Florida, Gainesville, FL
1991-1997 Fellow, Hematology/Oncology, Johns Hopkins University, Baltimore, MD

Professional Experience

- 1997-2000 Instructor, Medicine, Johns Hopkins University School of Medicine, Baltimore, MD
2000-2008 Assistant Professor, Medicine, Johns Hopkins University School of Medicine, Baltimore, MD
2003-present Medical Director, The Johns Hopkins Anticoagulation Management Service and Outpatient Clinics

2008-present Associate Professor, Medicine, Johns Hopkins University School of Medicine, Baltimore, MD

PUBLICATIONS:

Original Research [OR]

1. Loveys DA, ***Streiff MB**, Kato GJ. Id-3 is a General negative regulator of basic-helix-loop-helix transcriptional activators. *Nucleic Acids Res* 1996; 24(14):2813-2820. *provided experimental data [OR]
2. Loveys, DA, ***Streiff MB**, Schaefer, TS, Kato, GJ. The mUBC9 murine conjugating enzyme interacts with the E2A transcription factors. *Gene* 1997; 201(1-2):169-177. *provided experimental data [OR]
3. **Streiff MB**, Dundes L, Spivak JL. A mail survey of United States hematologists and oncologists: A comparison of business reply versus stamped return envelopes. *J Clin Epidemiol.* 2001; 54(4):430-432. [OR]
4. Arai S, Allan C, ***Streiff MB**, Hutchins GM Vogelsang GB, Tsai H-M. Von Willebrand factor-cleaving protease activity and proteolysis of von Willebrand factor in bone marrow transplant-associated thrombotic microangiopathy. *Hematol J.* 2001;2(5):292-299.*study design, manuscript writing [OR]
5. **Streiff MB**, Ness PM. Acquired factor V inhibitors: a needless iatrogenic complication of bovine thrombin exposure. *Transfusion.* 2002; 42(1):18-26. [OR]
6. **Streiff MB**, Spivak JL. The diagnosis and management of polycythemia vera in the post-polycythemia vera study group era: A survey of American Society of Hematology (ASH) members' practice patterns. *Blood.* 2002; 99(4):1144-1149. [OR]
7. Ogawa R, ***Streiff MB**, Bugayenko A, Kato GJ. Inhibition of PDE4 phosphodiesterase activity induces growth suppression, apoptosis, glucocorticoid sensitivity, p53 and p21^{WAF1/CIP1} proteins in human acute lymphoblastic leukemia cells. *Blood.* 2002; 99(9):3390-97. *provided experimental data [OR]
8. **Streiff MB**, Mehta S, Thomas DL. Peripheral blood count abnormalities among persons with hepatitis C in the United States. *Hepatology.* 2002; 35(4):947-952. [OR]
9. Segal JB, Eng J, Jenckes MW, Tamariz LJ, Bolger DT, Krishnan JA, ***Streiff MB**, Harris KA, Feuerstein CJ, Bass EB. Diagnosis and treatment of deep venous thrombosis and pulmonary embolism. *Evid Rep Technol Assess (Summ).* 2003;(68):1-6.*Data collection/analysis, manuscript writing [OR]
10. Segal JB, Bolger DT, Jenckes MW, Krishnan JA, ***Streiff MB**. Eng J, Tamariz LJ, Bass EB. Outpatient therapy with low molecular weight heparin for treatment of venous thromboembolism: a systematic review of efficacy, safety and costs. *Am J Med.* 2003; 115(4):298-308. * Data collection/analysis, manuscript editing [OR]
11. Thomas PA, Diener-West M, Canto MI, Martin DR, Post WS, **Streiff MB**. Academic promotion and career path: Results of a faculty survey at the Johns Hopkins University School of Medicine. *Acad Med.* 2004;79(3):258-264. [OR]
12. **Streiff MB**, Segal J, Grossman SA, Kickler TS, Weir EG. ABO blood group is a potent risk factor for venous thromboembolism in patients with malignant gliomas. *Cancer.* 2004; 100(8):1717-1723. [OR]
13. Krishnan JA, Segal JB, ***Streiff MB**, Bolger DT, Eng J, Jenckes MW, Tamariz LJ, Bass EB. Treatment of venous thromboembolism with low molecular weight heparin: A synthesis of the evidence published in systematic literature reviews. *Respir Med.* 2004; 98(5):376-386. * Data collection/analysis, manuscript editing [OR]
14. Tamariz LJ, Eng J, Segal JB, Krishnan JA, Bolger DT, ***Streiff MB**, Jenckes MW, Bass EB. Usefulness of clinical prediction rules for the diagnosis of venous thromboembolism: a systematic review. *Am J Med.* 2004; 117(9):767-784. * Data collection/analysis, manuscript editing [OR]
15. Eng J, Krishnan JA, Segal JB, Bolger DT, Tamariz LJ, ***Streiff MB**, Jenckes MW, Bass EB. Accuracy of computed tomography in the diagnosis of pulmonary embolism: a systematic literature review. *Am J Roentgen.* 2004; 183(6): 1819-1827. * Data collection/analysis, manuscript editing [OR]
16. de Alarcon P, Benjamin R, Dugdale M, Kessler C, Shopnick R, Smith P, Abshire T, Hambleton J, Matthew P, Ortiz I, Cohen A, Konkle B, ***Streiff MB**, Lee M, Corash L and Wages D. Fresh frozen plasma prepared with photochemical pathogen inactivation (PCT-FFP): Transfusion of patients with congenital coagulation factor deficiencies. *Transfusion.* 2005; 45(8):1362-1372. * Data collection, manuscript editing [OR]
17. Kim HS, Patra A, Khan J, Arepally A, **Streiff MB**. Transhepatic catheter-directed thrombectomy and thrombolysis of acute superior mesenteric venous thrombosis. *J Vasc Intervent Radiol.* 2005; 16(12):685-691. [OR]
18. Mintz PD, Bass NM, Steadman R, Petz LD, ***Streiff MB**, McCullough JJ, Burks S, Valentine ME, Corash L, Wages D. S-59 photochemically treated fresh frozen plasma for treatment of patients with the acquired

- coagulopathy of liver disease. *Blood*. 2006; 107(9):3753-3760. * Data collection/analysis, manuscript editing [OR]
19. **Streiff MB**, Segal JB, Tamariz LJ, Jenckes MW, Bolger DT, Eng J, Krishnan JA, Bass EB. Duration of oral anticoagulation for venous thromboembolism: A systematic review of the literature. *Am J Hematol*. 2006; 81(9):684-691. [OR]
20. Kim HS, Patra A, Paxton BE, Khan J, **Streiff MB**. Adjunctive percutaneous mechanical thrombectomy for lower extremity deep vein thrombosis: Clinical and economic outcomes. *J Vasc Interv Radiol*. 2006; 17(7):1099-1104. [OR]
21. Kim HS, Patra A, Paxton BE, Khan J, **Streiff MB**. Catheter-directed thrombolysis with percutaneous rheolytic thrombectomy vs. thrombolysis alone in upper and lower extremity DVT. *Cardiovasc Interv Radiol*. 2006; 29(6):1003-1007. [OR]
22. Gerber DE, Segal JB, Salhotra A, Olivi A, **Streiff MB**. Venous thromboembolism occurs rarely in post-operative meningioma patients receiving combined modality prophylaxis. *Cancer*. 2007; 109(2):300-305. [OR]
23. Segal JB, ***Streiff MB**, Hoffman LV, Thornton K, Bass EB. Management of venous thromboembolism with low molecular weight heparin, catheter-directed thrombolysis, vena cava filters, compression stockings and oral anticoagulants: a systematic review of the evidence. *Ann Intern Med*. 2007; 146(3):211-222. * Data collection/analysis, manuscript editing [OR]
24. Ahonkhai AA, Gebo KA, ***Streiff MB**, Moore RD, Segal JB. Venous thromboembolism in patients with HIV/AIDS: A case-control study. *J Acquir Immune Defic Syndr*. 2008; 48(3):310-314. * Study design, manuscript editing [OR]
25. Kim HS, Preece SR, Black JH, Pham LD, **Streiff MB**. Safety of catheter-directed thrombolysis for deep venous thrombosis in cancer patients. *J Vasc Surg*. 2008; 47(2):388-394. [OR]
26. Kim HS, Young MJ, Narayan AK, Hong K, Liddell RP, **Streiff MB**. A comparison of clinical outcomes with retrievable and permanent inferior vena cava filters. *J Vasc Interv Radiol*. 2008; 19:393-399. [OR]
27. Gerber DE, Segal JB, Levy MY, Kane J, Jones RJ, **Streiff MB**. The incidence of and risk factors for venous thromboembolism (VTE) and bleeding among 1,514 patients undergoing hematopoietic stem cell transplantation: Implications for VTE prevention. *Blood*. 2008; 112(3):504-510. [OR]
28. Biscup-Horn P, ***Streiff MB**, Ulbrich T, Nesbit TW, Shermock KM. Impact of an anticoagulation management service on inpatient clinical and economic outcomes. *Ann Pharmacother*. 2008; 42(6):777-782. * Study design, Data collection/analysis, manuscript editing [OR] [QI/SI]
29. Shermock KM, Connor JT, Lavallee DC and **Streiff MB**. Clinical decision-making as the basis for assessing agreement between measures of the International Normalized Ratio. *J Thromb Haemost*. 2009; 7(1):87-93. [OR] [QI/SI]
31. Zhan H, ***Streiff MB**, King KE, Segal JB. Thrombotic thrombocytopenic purpura at the Johns Hopkins Hospital from 1992 to 2008: Clinical outcomes and risk factors for relapse. *Transfusion*. 2010; 50(4):868-874. * Study design, data collection/analysis, manuscript editing [OR]
32. Shermock KM, Connor JT, Lavallee DC, **Streiff MB**. Assessment of agreement between INR measures must correspond to a clinical reality. *Clin Chim Acta*. 2010; 411(17-18):1384-1385. [OR] [QI/SI]
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34. Dalrymple PW, Lehmann HP, Roderer NK, **Streiff MB**. Applying evidence in practice: a qualitative case study of the factors affecting residents' decisions. *Health Informatics J*. 2010; 16(3):177-188. [OR]
35. Raman R, Leming PD, Bhandari M, Long D, **Streiff MB**. Inferior vena cava filters in the management of cancer-associated venous thromboembolism: A systematic review. *Oncol Rev* 2010; 4(3):147-157. [OR]
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37. Haut ER, Schneider EB, Patel A, ***Streiff MB**, Haider AH, Stevens KA, Chang DC, Neal ML, Hoeft C, Nathens AB, Cornwell EE 3rd, Pronovost PJ, Efron DT. Duplex Ultrasound Screening for Deep Vein Thrombosis in Asymptomatic Trauma Patients: A Survey of Individual Trauma Surgeon Opinions and Current Trauma Center Practices. *J Trauma*. 2011; 70(1):27-34. * Data analysis, manuscript editing [OR]
38. Wellman JC, Kraus PS, Burton BL, Ensor CR, Nesbit TW, Ross PA, Thomas ML, **Streiff MB**. Development

- and implementation of a pharmacist-managed inpatient anticoagulation monitoring program. Am J Health Syst Pharm. 2011; 68(10):934-939. [OR] [QI/SI]
39. Boelig MM, ***Streiff MB**, Hobson DB, Kraus PS, Pronovost PJ, Haut ER. Are sequential compression devices commonly associated with in-hospital falls? A myth-busters review using the patient safety net database. J Patient Saf. 2011; 7(2):77-79. * Study design, data analysis, manuscript editing [OR]
40. Shermock KM, ***Streiff MB**, Pinto BL, Kraus P, Pronovost PJ. Novel analysis of clinically relevant diagnostic errors in point-of-care devices. J Thromb Haemost. 2011; 9(9):1769-1775. * Data analysis, manuscript editing [OR] [QI/SI]
41. Tabibian JH, Streiff MB. Inflammatory bowel disease-associated thromboembolism: A systematic review of outcomes with anticoagulation versus catheter-directed thrombolysis. Inflamm Bowel Dis. 2012; 18(1):161-171. [OR]
42. Mayer RS, ***Streiff MB**, Hobson DB, Halpert DE, Berenholtz SM. Evidence-based venous thromboembolism prophylaxis is associated with a six-fold decrease in numbers of symptomatic venous thromboembolism in rehabilitation inpatients. PM R. 2011; 3(12):1111-1115. * Study design, data collection/analysis, manuscript editing [OR] [QI/SI]
43. Shermock KM, Tandon S, Sorgen PJ, Lavallee DC, Clarke W, **Streiff MB**. Comparative performance of two methods that assess the quality of international normalized ratio measures. Clin Biochem. 2012; 45(7-8):530-534. [OR] [QI/SI]
44. **Streiff MB**, Carolan HT, Hobson DB, Kraus PS, Holzmueller CG, Demski R, Lau BD, Biscup-Horn P, Pronovost PJ, Haut ER. Lessons from the Johns Hopkins Multi-Disciplinary Venous Thromboembolism (VTE) Prevention Collaborative. BMJ. 2012; 344:e3935. [OR] [QI/SI]
45. Haut ER, Lau BD, Kraenzlin FS, Hobson DB, Kraus PS, Carolan HT, Haider AH, Holzmueller CG, Efron DT, Pronovost PJ, **Streiff MB**. Improved prophylaxis and decreased rates of preventable harm with the use of a mandatory computerized clinical decision support tool for prophylaxis for venous thromboembolism in trauma. Arch Surg. 2012; 147(10):901-907. [OR] [QI/SI]
46. Carter KL, Streiff MB, Ross PA, Wellman JC, Thomas ML, Kraus PS, Shermock KM. Analysis of the projected utility of dabigatran, rivaroxaban, and apixaban and their future impact on existing Hematology and Cardiology Anticoagulation Clinics at The Johns Hopkins Hospital. J Thromb Thrombolysis. 2012; 34(4):437-445. * Study design, data collection/analysis, manuscript editing [OR]
47. Darbari DS, Desai D, Arnaldez F, Desai K, Kallen J, Strouse J, ***Streiff MB**, Hong K, Takemoto CM. Safety and efficacy of catheter directed thrombolysis in children with deep venous thrombosis. Br J Haematol. 2012; 159(3):376-378. * Data analysis, manuscript editing [OR]
48. Narayan A, Eng J, Carmi L, McGrane S, Ahmed M, Sharrett AR, Streiff MB, Coresh J, Powe N, Hong K. Iliac vein compression as risk factor for left-versus right-sided deep venous thrombosis: Case-control study. Radiology. 2012; 265(3):949-957. * Study design, data analysis, manuscript editing [OR]
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50. Monn MF, Haut ER, Lau BD, ***Streiff MB**, Wick EC, Efron JE, Gearhart SL. Is venous thromboembolism in colorectal surgery patients preventable or inevitable? One institution's experience. J Am Coll Surg. 2013; 216(3):395-401. * Study design, data collection/analysis, manuscript editing [OR]
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52. Aboagye JK, Lau BD, Schneider EB, ***Streiff MB**, Haut ER. Linking processes and outcomes: a key strategy to prevent and report harm from venous thromboembolism in surgical patients. JAMA Surg. 2013; 148(3):299-300. * Data analysis, manuscript editing [OR] [QI/SI]
53. Naik RP, Streiff MB, Haywood C Jr, Nelson JA, Lanzkron S. Venous Thromboembolism in adults with sickle cell disease: A serious and under-recognized complication. Am J Med. 2013; 126(5):443-449. * Study design, data analysis, manuscript editing [OR]
54. Shermock KM, Lau BD, Haut ER, Hobson DB, Ganetsky VS, Kraus PS, Efird LE, Lehmann CU, Pinto BL, Ross PA, **Streiff MB**. Patterns of non-administration of ordered doses of venous thromboembolism prophylaxis: Implications for novel intervention strategies. PLoS One. 2013; 8(6):e66311. [OR] [QI/SI]
55. Zeidan AM*, Streiff MB*, Lau BD, Ahmed SR, Kraus PS, Hobson DB, Carolan H, Lambrianidi C, Horn PB, Shermock KM, Tinoco G, Siddiqui S, Haut ER. Impact of a venous thromboembolism (VTE) prophylaxis

- "smart order set": Improved compliance, fewer events. Am J Hematol. 2013; 88(7):545-549. * equal first author effort - * Study design, data collection/analysis, manuscript writing and editing [OR] [QI/SI]
56. Shinohara RT, Narayan AK, Hong K, Kim HS, Coresh J, ***Streiff MB**, Frangakis CE. Estimating parsimonious models of longitudinal causal effects using regressions on propensity scores. Stat Med. 2013; 32(22):3829-3837. * Manuscript editing [OR]
57. Takemoto CM, Sohi S, Desai K, Bharaj R, Khanna A, McFarland S, Klaus S, Irshad A, Goldenberg NA, Strouse JJ, **Streiff MB**. Hospital-Associated Venous Thromboembolism in Children: Incidence and Clinical Characteristics. J Pediatr. 2014; 164(2):332-338. [OR]
58. Lonze BE, Zachary AA, Magro CM, Desai NM, Orandi BJ, Dagher NN, Singer AL, Carter-Monroe N, Nazarian SM, Segev DL, ***Streiff MB**, Montgomery RA. Eculizumab prevents recurrent antiphospholipid antibody syndrome and enables successful renal transplantation. Am J Transplant. 2014; 14(2):459-465. * Data analysis, manuscript editing [OR]
59. Bishop MA, ***Streiff MB**, Ensor CR, Tedford RJ, Russell SD, Ross PA. Pharmacist-managed international normalized ratio patient self-testing is associated with increased time in therapeutic range in patients with left ventricular assist devices at an academic medical center. ASAIO J. 2014; 60(2):193-198. * Study design, data analysis, manuscript editing [OR] [QI/SI]
60. Newman MJ, Kraus PS, Shermock KM, Lau BD, Haut ER, Hobson DB, **Streiff MB**. Non-administration of thromboprophylaxis in hospitalized patients with HIV: A missed opportunity for prevention? J Hosp Med. 2014; 9(4): 215-220. [OR] [QI/SI]
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 7. Wagman LD*, Baird MF, Bennett CL, Bockenstedt PL, Cataland SR, Fanikos J*, Fogarty P*, Goldhaber SZ, Grover TS, Haire W, Hassoun H, Hutchinson S, Jahanzeb M, Lee J, Linenberger M, Millenson M, Ortel TL, Salem R, Smith JL, **Streiff MB***, Vedantham S. Venous thromboembolic disease: Clinical practice guideline in oncology. *J Natl Compr Canc Netw* 2008; 6(8): 716-753. * Writing committee [GL]
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Letters [LT]

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5. Shermock KM, Kraus P, **Streiff MB**. Novel analysis of clinically relevant diagnostic errors in point-of-care devices: a reply to a rebuttal. J Thromb Haemost. 2012; 10(6):1192-1194. [LT]
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Other media (films, videos, CD-ROMS, slide sets, etc.) [OM]

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 Locke C, Feldman L, **Streiff MB**. Johns Hopkins consultative medicine essentials for hospitalist's E-learning website teaching module on venous thromboembolism, 2009. Available at <http://www.jhcme.com/site/index.cfm> [OM]
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13. **Streiff MB**. Venous Thromboembolism. Decision Support module on VTE management. Available on Decision Support in Medicine™ <https://www.decisionsupportinmedicine.com/DSM/p/contactus> 2013
14. **Streiff MB**. Hypercoagulable States. Decision Support module on VTE management. Available on Decision Support in Medicine™ <https://www.decisionsupportinmedicine.com/DSM/p/contactus> 2013
15. Locke C, Feldman L, **Streiff MB**. Johns Hopkins consultative medicine essentials for hospitalists E -learning website teaching module on surgical VTE prophylaxis, 2014. Available at <http://www.jhcme.com/site/index.cfm> [OM]
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17. Medscape Controversies in Management of VTE Video shoot- Washington DC, 2015 [OM]
18. Medscape module, Current controversies in Orthopedic VTE Prevention video, Baltimore, MD, 2015 [OM]
19. Medscape "Current Approach to Outpatient Management of VTE" video Baltimore, MD, 2015 [OM]
20. Medscape "Current Approach to Management of Cancer-Associated VTE" video Baltimore, MD, 2015 [OM]
21. Anticoagulation Forum Webinar, Management of Venous Thromboembolism, 2015 [OM]
22. Johns Hopkins Armstrong Institute webinar, Prevention of Venous Thromboembolism, 2015 [OM]
23. Medscape Video on "Improving the Quality of Anticoagulation Management", Chicago, IL, 2016 [OM]
24. **Streiff MB**. Venous Thromboembolism. Update of Decision Support module on VTE management. Available on Decision Support in Medicine™ <https://www.decisionsupportinmedicine.com/DSM/p/contactus> 2016 [OM]
25. **Streiff MB**. Hypercoagulable States. Update of Decision Support module on VTE management. Available on Decision Support in Medicine™ <https://www.decisionsupportinmedicine.com/DSM/p/contactus> 2016 [OM]

FUNDING:

Extramural Funding (current, pending, previous)

Current Grants:

Active

05/14/15-12/31/20 Efficacy and Safety of Rivaroxaban Prophylaxis compared with Placebo in Ambulatory Cancer Patients initiating Systemic Cancer Therapy and at high risk for Venous Thromboembolism

ICD 811404

Janssen Research & Development

\$148,000

Alok Khorana MD

Site PI 4%

Randomized controlled trial of targeted VTE prophylaxis with rivaroxaban in high-risk ambulatory cancer patients

05/01/16-02/28/21 Individualized Performance Feedback on Venous Thromboembolism Prevention Practice

RO1HS024547

AHRQ

\$1,247,190

Elliott R. Haut, MD PhD

Co-investigator 2%

Prospective cohort study of the impact of individualized feedback on VTE prophylaxis performance

Pending

02/01/17-12/31/17 RE-COVERY CVT/PE- Characterization of patients following Acute Venous Thromboembolism (VTE) and assessment of safety and effectiveness of Dabigatran Etxilate (DE) in the Treatment and Secondary prevention of Acute Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE) in comparison to Vitamin K Antagonist (VKA) in routine clinical practice

Boehringer Ingelheim

Samuel Goldhaber MD

Site PI

Phase 4 post-marketing observational study of dabigatran and other oral anticoagulants in the treatment of VTE

Previous

12/15/07-6-30-11 ADOPT: Apixaban Dosing to Optimize Protection from Thrombosis in medically ill

patients

CV185036

Bristol-Myers Squibb Company

\$404,529

PI: Samuel Goldhaber MD

Site PI, 5%

7/7/09- 8/30/13

Predictors of Anticoagulation Control on Warfarin

5-R01-HL-066176-03

NIH-NHLBI

\$319,994

PI: Stephen Kimmel MD, MSCE, Univ of Penn

Site PI, 5%

2/13/14 – 9/1/15

APEX- Multicenter, Randomized, Active-Controlled Efficacy and Safety Study Comparing Extended Duration Betrixaban With Standard of Care Enoxaparin for the Prevention of Venous Thromboembolism in Acute Medically Ill Patients

11-019

Portola Pharmaceuticals Inc.

PI: Alexander Cohen, MD

\$94,174

Site PI, 5%

7/1/2013-6/30/16

Preventing Venous Thromboembolism: Empowering Patients and Enabling Patient-Centered Care via Health Information Technology

CE-12-11-4489

Patient Centered Outcomes Research Institute (PCORI)

\$1,499,194
PI: Elliott R. Haut
MD Co-investigator,
5%

CLINICAL ACTIVITIES:

Clinical Focus: My clinical focus is the management of venous thromboembolism (VTE) and disorders of hemostasis. This focus prompted me to launch the Johns Hopkins Anticoagulation Management Service in 2003 in collaboration with the Department of Pharmacy. Our multidisciplinary service operates clinics in the Departments of Medicine and Oncology and provides inpatient consultative services for anticoagulation management at the Johns Hopkins Hospital. In addition, I co-founded the Johns Hopkins VTE Collaborative in 2005 which has made numerous contributions to improve VTE prevention at the Johns Hopkins Hospital. I am the adult Medical Director for the Johns Hopkins Comprehensive Hemophilia Treatment Center.

Certification

Medical, other state/government licensure:
1991 – Present Maryland, D42486

Boards, other specialty certification:

1991 American Board of Internal Medicine
1994 American Board of Internal Medicine, Hematology
1995 American Board of Internal Medicine, Medical Oncology

Clinical (Service) Responsibilities:

1997-present Johns Hopkins Hematology Inpatient/Consultation Service, attending physician, 10-14 weeks per year
1997-present Johns Hopkins Hematology Outpatient Clinic, attending physician-two-three days per week
1997-present Bone Marrow/Peripheral Blood Smear Interpretation-every six-to eight weeks
2000-present Johns Hopkins Hematology Postdoctoral Fellows Outpatient Clinic-supervising attending physician-every six to eight weeks
2000-present Johns Hopkins Comprehensive Hemophilia Treatment Center Outpatient Clinic, attending physician, monthly clinic
2000-present Department of Medicine Thayer firm faculty-attending teaching physician- one month a year
2004-present Johns Hopkins Anticoagulation Management Service and Outpatient Clinic, Medical Director,12 months per year

Clinical Productivity: My clinical duties include 2- 3 half-days each week in my Hematology outpatient clinic and 1 half day in Hemophilia clinic each month. I supervise fellows in the Hematology Fellows clinic 7-8 times each year. I am the inpatient Hematology service attending 11 weeks a year. I interpret peripheral blood smear and bone marrows eight weeks each year. As the Medical Director of the Anticoagulation Management Service, I oversee the clinical operations of the anticoagulation clinics in the Department of Medicine and Oncology which see more than 3500 patients annually. Total RVUs for fiscal year 2016 through May 2016 were 2667.

Clinical Draw from outside local/regional area: Although most of my patients live in the Baltimore-Washington region, I see US patients from as far away as Florida, Oregon, Kansas and Missouri. I see a number of international patients primarily from the Middle East including United Arab Emirates, Saudi Arabia, Qatar, Bahrain and Kuwait. I have also seen patients from South and Central American countries and Southeast Asia.

Membership in or examiner for specialty board: N/A

Clinical Program Building / Leadership:

2003-Present Johns Hopkins Anticoagulation Management Service/Anticoagulation Outpatient Clinic, Medical Director 20% Effort

In 2003, Todd Nesbit and I, under the leadership of Dan Ashby and Chi Dang, collaborated to establish the multidisciplinary Johns Hopkins Anticoagulation Management Service with the purpose of developing and implementing an evidence-based anticoagulation management service for inpatients and outpatients. In October of 2003, we opened the Hematology Anticoagulation Outpatient clinic with 3 half-day clinic sessions and one full-time pharmacist and one full-time physician assistant. In our first year, there were 1200 patient visits. Currently the Hematology AC clinic has 10 half-day sessions per week and 4500 patient visits annually. The Hematology AC clinic is now staffed with 10 pharmacists and trains one pharmacy resident per month. The Oncology AC clinic is staffed with 4 pharmacists and 2 pharmacy residents. Our Hematology outpatient AC clinic that originally had 3 half-day sessions weekly has grown to 10 half-day sessions per week (Clinical Co-Director: Peggy Kraus PharmD). In addition, we have opened an Oncology AC clinic that provides AC management services 5 days a week in the Weinberg Oncology outpatient clinic (Oncology clinic directors: Vicky Brown PharmD and Brad Burton PharmD).

In 2008, our service developed an inpatient training program for pharmacists and started an inpatient anticoagulation management program which now provides anticoagulation consulting services to all the inpatient services, a program initiated by Jessica Wellman PharmD and Patricia Ross PharmD. Our outpatient clinics provide comprehensive anticoagulation services including perioperative anticoagulation management and prevention of post-thrombotic syndrome via our graduated compression stockings clinic at The Johns Hopkins Outpatient Center Pharmacy locations in the Outpatient Center and Monument street. To improve venous health, we have collaborated with the Department of Interventional Radiology to refer appropriate patients for vena cava filter retrieval and catheter-directed pharmacomechanical thrombolysis/thrombectomy. The Anticoagulation Management Service played a key leadership role in the Johns Hopkins Hospital's initiative to fulfill the 2008 National Patient Safety Goals in Anticoagulation. Our team staffs all the subcommittees and leads the steering committee of the Anticoagulation Practice Group in collaboration with Catherine Edwards RN of Quality Improvement. Our warfarin patient education video, "Living with Warfarin" which was supported by the Johns Hopkins Women's Board and filmed by the Johns Hopkins Multimedia was nominated for a patient education video award and has been featured on the Anticoagulation Forum website, an international organization of healthcare professionals dedicated to quality anticoagulation management that has over 3000 members. Our team has also played an important role in the harmonization of anticoagulation management across all 5 Johns Hopkins Medicine entities. We have worked closely with the EPIC team to develop anticoagulation order sets that will be used at all 5 Johns Hopkins Medicine healthcare facilities.

Our service plays a key role in the education of pharmacy residents about anticoagulation management. Each year the ambulatory care and oncology pharmacy resident rotate through the Hematology and Oncology AC clinics to gain experience in the management of anticoagulants. In addition to this hands-on experience, we hold twice monthly AC Clinic conferences via web link with our colleagues at the anticoagulation clinics at the Johns Hopkins Bayview Medical Center and Howard County General Hospital at which residents present recent cases for discussion. We also have had invited speakers lecture at this conference on topics including thrombophilia, venous thromboembolism pathogenesis and management, management of vena cava filters, antiphospholipid syndrome, post-thrombotic syndrome and thromboprophylaxis of mechanical heart valves, etc. The Anticoagulation Management Service has supervised a number of pharmacy resident research projects, many of which have been presented at national meetings such as the Anticoagulation Forum and the Thrombosis Hemostasis Summit of North America. A number of these projects have been subsequently published. (Original Research references 28, 29, 32-34, 40, 43, 46, and 89; Other media references 3, 4, 5, 7, 8, 10, 12, 16, 23). National and international recognition of our program has resulted in my election to the Board of the Anticoagulation Forum in 2013 and the President of the Medical and Scientific Advisory Board in 2014 for the National Blood Clot Alliance, the largest patient advocacy organization for patients with blood clots. I have also been asked to present numerous topics involving anticoagulation management at national/international meetings including the American Society of Hematology annual meeting, the Society of Hospital Medicine Annual meeting, Anticoagulation Forum, Thrombosis and Hemostasis Summit of North American and at the Food and Drug Administration.

Clinical Demonstration Activities to external audience, on or off campus: N/A

Development of nationally/internationally recognized clinical standard of care: N/A

EDUCATIONAL ACTIVITIES

Educational Focus: My educational focus is teaching medical students, resident and fellows and colleagues about hemostasis and thrombosis, VTE and anticoagulation management. I teach the hemostasis and thrombosis lectures to the medical students each year in the Genes to Society course. In addition I teach medical and surgical house staff and the hematology and oncology fellows about hemostasis, thrombosis and anticoagulation management in their lecture series annually. I have also given lectures on these topics to residents in other training programs inside and outside Johns Hopkins.

Teaching

Classroom instruction

JHMI/Regional

1997-2000	Lecturer, medical students, Medicine clerkship lecture series. The Johns Hopkins University School of Medicine, Baltimore, MD
1997-1998	Lecturer, medical students and residents, Good Samaritan Hematology Lecture Series. Good Samaritan Hospital, Baltimore
1998-present	Lecturer, medical students and residents, Medicine House staff noon conference lecture series, The Johns Hopkins University School of Medicine, Baltimore, MD
1999-present	Lecturer, medical students, Hemostasis and Thrombosis lectures in Pathophysiology/Genes to society Hematology course, The Johns Hopkins University School of Medicine, Baltimore, MD
1999-present	Small group leader, medical students, Pathophysiology/Genes to Society Hematology course, The Johns Hopkins University School of Medicine, Baltimore, MD
2000-2001	Lecturer, graduate students, Pathobiology course, Hemostasis lecture and journal club, The Johns Hopkins University School of Medicine, Baltimore, MD
2000	Lecturer, nursing students, Johns Hopkins School of Nursing seminar on abnormalities in coagulation
2000	Lecturer, pathology residents, Johns Hopkins Department of Pathology Clinical Pathology Unknown Case Conference
2000-present	Lecturer, Oncology fellows, Oncology fellows conference, The Johns Hopkins University School of Medicine, Baltimore, MD
2001-present	Co-Organizer, Lecturer, medical students, medicine, pediatric and pathology residents and fellows as well as faculty, Coagulation rounds, weekly, The Johns Hopkins University School of Medicine, Baltimore, MD
2001-2005	Lecturer, Pathology residents, Johns Hopkins Clinical Pathology Noon Conference
2001	Lecturer, Radiology residents, Johns Hopkins Department of Radiology In service on Anticoagulants and Invasive Procedures
2001	Lecturer, medical students, medicine residents, Hematology and Oncology fellows, Johns Hopkins Oncology Center Myeloid Disorders Conference
2003	Lecturer, medical residents, Johns Hopkins Bayview House staff Noon Conference
2003	Lecturer, pathology residents, Johns Hopkins Hospital Department of Pharmacy Noon Lecture Series,
2004-2012	Lecturer, radiology residents and interventional radiology fellows, Johns Hopkins Department of Radiology, Interventional Radiology Fellows lecture series, The Johns Hopkins University School of Medicine, Baltimore, MD
2004, 2013	Lecturer, neurology residents and faculty, Department of Neurology Noon Conference, Johns Hopkins Hospital Baltimore MD
2004	Lecturer, nurse and social workers, Johns Hopkins Homecare Noon Conference, Baltimore MD
2004-present	Lecturer, surgery residents, Department of Surgery House staff morning conference, The Johns Hopkins University School of Medicine, Baltimore, MD
2004-2008	Lecturer, 4 th year medical students, A Rational Approach to anticoagulants, Rational Therapeutics course, The Johns Hopkins University School of Medicine, Baltimore, MD
2004-present	Lecturer, Nurses and nurse practitioners, Hematology Service In service lectures for

hematology nursing staff
 2005 Lecturer, Medical students, residents and post-doctoral fellows, Johns Hopkins Oncology Center Solid Tumor Conference, Johns Hopkins Hospital Baltimore MD

Lecturer, Pathology residents and Transfusion Medicine fellows and faculty, Johns Hopkins Department of Pathology Transfusion Medicine Rounds, Baltimore, MD

2006, 2008, 2009 Lecturer, Physicians, Nurses and Nurse practitioners and staff, Cardiothoracic ICU Rounds Lecture, Johns Hopkins Hospital, Baltimore, MD

2006 Lecturer, Medical residents, MICU Resident Rounds, Johns Hopkins Hospital, Baltimore, MD

2006, 2007, 2012 Lecturer, Orthopedic residents and faculty, Department of Orthopedics Residents Clinical Conference, Johns Hopkins Hospital, Baltimore, MD

2006 Lecturer, Residents and faculty, St. Agnes Cancer Center Rounds, St Agnes Hospital, Baltimore, MD

2006 Lecturer, Medical residents, St. Agnes Medical House staff Noon Conference, St Agnes Hospital, Baltimore, MD

2008 Lecturer, Local hematologists and oncologists, American Society of Hematology Annual Meeting Highlights sponsored by the Leukemia and Lymphoma Society of America at the Center Club, Baltimore MD

2008-2015 Lecturer, NP and PA Students, Surgical Nurse Practitioner/Physician Assistant Lecture Series

2008-present Co-Organizer, lecturer, Pharmacists, nurses and pharmacy residents, AC clinic conference, every 2 weeks, The Johns Hopkins University School of Medicine, Baltimore, MD

2009 Lecturer, OB/GYN residents and faculty, Department of OB/GYN Resident Conference, Johns Hopkins Hospital, Baltimore, MD

2009 Lecturer, Medicine residents, Department of Medicine House staff Noon Conference, Good Samaritan Hospital, Baltimore, MD

2011-present Lecturer, Hematology fellows, Hematology fellows educational lecture series- 2-3 lectures annually, The Johns Hopkins University School of Medicine, Baltimore, MD

2012 Lecturer, Cardiology fellows and faculty, Division of Cardiology Friday Noon Conference, Johns Hopkins, Baltimore, MD

2013 Lecturer, General Internal Medicine fellows and faculty, Johns Hopkins General Internal Medicine Fellows Noon Conference, Johns Hopkins University School of Medicine, Baltimore, MD

2014 Lecturer, Faculty and staff from Johns Hopkins Medicine, Johns Hopkins Clinical Communities, Howard County General Hospital

2014 Lecturer, Providers in the Moore Clinic, HIV Providers Noon Conference, Johns Hopkins Medical Institutions, Baltimore, MD

2014, 2016 Lecturer, Vascular surgery residents, fellows, faculty and staff, Department of Vascular Surgery Residents lecture Series- Johns Hopkins Medical Institutions, Baltimore, MD

2015 Lecturer, Cardiology fellows and faculty, Cardiology Division Noon Conference, Johns Hopkins University School of Medicine, Baltimore, MD

National: N/A

International: N/A

Clinical Instruction:

JHMI/Regional: N/A

National: N/A

International: N/A

CME instruction:

JHMI/Regional:

- 1999-2008 Lecturer, Post-graduate physicians, The Johns Hopkins Internal Medicine Board Review Course, The Johns Hopkins University School of Medicine, Baltimore, MD
- 2000-2015 Lecturer, Community physicians and faculty, Topics in Internal Medicine, The Johns Hopkins University School of Medicine, Baltimore, MD
- 2000 Lecturer, Community physicians and faculty, Critical Issues in Laboratory Medicine/Surgical Pathology, Johns Hopkins University School of Medicine Department of Pathology, Baltimore, MD
- 2003, 2007 Lecturer, Residents and staff physicians, Upper Chesapeake Health Care System Hematology/Oncology Symposium, Upper Chesapeake Medical Center, Baltimore, MD
- 2004, 2005 Lecturer, Residents and staff physicians, St. Agnes Hospital Symposium on Coagulation Disorders, St. Agnes HealthCare, Baltimore, MD
- 2005, 2011 Lecturer, Community cardiologists and faculty, Johns Hopkins Topics in Cardiology, The Johns Hopkins University School of Medicine, Baltimore, MD
- 2006, 2009, 2013 Lecturer, Physician members of the American College of Physicians-Maryland Chapter, Maryland American College of Physicians Annual Scientific Meeting, Turf Valley Resort, Ellicott City, MD
- 2007 Lecturer, Residents and staff physicians, 9th Annual Hematology/Oncology Symposium Upper Chesapeake Medical Center- Belair, MD
- 2010 Lecturer, Physician members of the Mid-Atlantic Chapter of the American Urological Association, American Urological Association Mid-Atlantic Annual Meeting, Nemacolin Resort, PA
- 2014 Lecturer, Maryland physician members of the Maryland Society of Hospital Medicine, Maryland Society of Hospital Medicine, Hospital Medicine Day Lecture , Columbia MD

National:

- 1998 Lecturer, Physician Assistants, Hematology Disorders, National Commission on the Certification of Physician Assistants, Baltimore MD 2/27/1998
- 2007 Lecturer, Attendees of the American Society of Clinical Oncology Annual Meeting, ASCO Symposium: Symptom Clusters in Supportive Care, Chicago IL
- 2007 Lecturer, Moderator, Attendees at the American Society of Hematology Annual Meeting, Severing the Deadly Tie between Thromboembolism and Cancer: A Case-Based Guide to Thromboprophylaxis in Malignancy, American Society of Hematology Annual Meeting Industry Satellite Symposium sponsored by Sanofi-Aventis, Atlanta, GA
- 2010 Lecturer and Moderator, Attendees at the American Society of Clinical Oncology Annual Meeting, "Clinical Coagulation Cases in Cancer" Satellite Symposium at the American Society of Oncology Meeting, Chicago, IL
- 2011 Lecturer, Residents, post-doctoral fellows and faculty, American Society of Hematology Annual Meeting Review course- Ochsner Clinic- New Orleans, LA
- 2011 Lecturer, Members of the Oncology Nursing Society, Venous Thromboembolism Prophylaxis- Current and Investigational Drugs Satellite Symposium, Oncology Nursing Society-Boston MA
- 2013 Lecturer, Physicians and allied health professionals, Quest Diagnostics Lab-Bedside Conference Tyson's Corner VA
- 2013 Lecturer, Attendees at the American Society of Hematology Highlights meeting, American Society of Hematology Annual Meeting Highlights- Miami, FL
- 2014 Lecturer, Attendees, Highlights of the Anticoagulation Forum, Miami FL

International

- 2011 Lecturer, Session Chair, Conference attendees, VTE Experts Meeting 2011 sponsored by Sanofi-Aventis- London England UK (2 lectures)
- 2011 Lecturer, Conference attendees, 3rd Annual Obstetrics Update- Corniche Hospital- Abu Dhabi (Three

- Lectures)
- 2016 Lecturer, Physician staff, Medical Grand Rounds, Saudi-Aramco-Dammam Hospital, Dammam Saudi Arabia
- 2016 Lecturer, Hematology/Oncology staff, Hematology Rounds, King Fahad Specialist Hospital, Dammam, Saudi Arabia

Workshops /seminars:

JHMI/Regional:

- 2005 Speaker, organizer, Faculty and staff, Johns Hopkins Hospital Deep Venous Thrombosis Prevention Collaborative Meetings sponsored by The Center For Innovations in Quality Patient Care, Johns Hopkins Hospital, Baltimore, MD
- 2008 Speaker, Organizer, General Public, National Blood Clot Alliance-“Stop the Clot” community awareness event held at The Al Owens Lecture Hall CRB2 JHMI
- 2008 Speaker, Hemophilia patients and their family members, Hemophilia Foundation of Maryland Conference for patients with bleeding disorders, Baltimore, MD
- 2009-Present Speaker, Organizer, Faculty, residents, fellows, students and allied health professionals, 1st Annual VTE Awareness Day symposium at Hurd Hall, Keynote speakers, Acting Surgeon General, Admiral Steven Galson, John Heit MD, Mayo Clinic, Susan Kahn MD, Johns Hopkins Hospital, Baltimore, MD
- 2009 Speaker, Pharmacist members of MHSP VTE prophylaxis- Maryland Health Systems Pharmacy Association Annual Meeting- Maritime Institute, Linthicum Heights MD 3-28-09
- 2010 Speaker, Organizer, Faculty, residents, fellows, students and allied health professionals, 2nd Annual VTE Awareness Day symposium at Hurd Hall, Keynote speaker, William Geerts, MD
- 2011 Speaker, organizer, Faculty, residents, fellows, students and allied health professionals, 3rd Annual VTE Awareness Day symposium at Hurd Hall, Keynote speaker, Sam Z. Goldhaber, MD, President and Founder North American Thrombosis Forum, Professor of Medicine Harvard University
- 2012 Speaker, Organizer, Faculty, residents, fellows, students and allied health professionals, 4th Annual VTE Awareness Day symposium at Hurd Hall, Keynote speaker, David in Garcia, MD, President of Anticoagulation Forum, Professor of Medicine, University of Washington
- 2013 Speaker, Organizer, Faculty, residents, fellows, students and allied health professionals, 5th Annual VTE Awareness Day symposium at Hurd Hall, Keynote speaker, Joseph Caprini, MD, Professor of Surgery, Northwestern University
- 2013 Speaker, General Public, Stop-The-Clot Forum, National Blood Clot Alliance, Sykesville MD
- 2014 Speaker, Organizer, Faculty, residents, fellows, students and allied health professionals, 6th Annual VTE Awareness Day symposium at Hurd Hall, Keynote speaker, Lisa Richardson MD, MPH, Director of Blood Diseases Branch CDC
- 2015 Speaker, Organizer, Faculty, residents, fellows, students and allied health professionals, 7th Annual VTE Awareness Day symposium at Hurd Hall, Keynote speaker, Mark Crowther, MD, Professor of Medicine and Pathology, McMaster University
- 2016 Speaker, Organizer, Faculty, residents, fellows, students and allied health professionals, 8th Annual VTE Awareness Day symposium at Hurd Hall, Keynote speaker, Richard H. White, MD, Professor of Medicine, University of California at Davis

National:

- 2006 Lecturer, Attendees, Sanofi-Aventis National Investigators Meeting, Las Vegas, Nevada
- 2006 Lecturer, Attendees, Sanofi-Aventis National Investigators Meeting, Williamsburg, VA
- 2006 Speaker, Attendees, Eisai Pharmaceutical, Inc. National Investigators Meeting, Orlando, FL
- 2007 Speaker, Attendees, Sanofi-Aventis National Speakers Training Meeting, invited speaker, San Francisco, CA

2009	Speaker, Members of Society of Hospital Medicine, Society of Hospital Medicine Annual Meeting, Chicago, IL
2009	Speaker and Consultant, Attendees and staff, Centers for Disease Control and Prevention Conference on U.S. Medical Eligibility Criteria for Contraceptive Use, Atlanta, GA
2014	Lecturer, Attendees and staff, Joint Commission Meeting for VTE Prevention Collaborative, Joint Commission, Forest Park IL
2015	Lecturer, Attendees and staff, Johns Hopkins Progress report for the Joint Commission VTE Prevention Collaborative, Los Angelos, CA
2015	Discussant, Attendees and staff, Strategies to Improve VTE Prevention, Joint Commission Leadership Advisory Committee telephone conference
2015	Lecturer, Attendees and staff, Johns Hopkins Progress report for the Joint Commission VTE Prevention Collaborative, Dallas TX
2016	Lecturer, Attendees and staff, Johns Hopkins Progress report for the Joint Commission VTE Prevention Collaborative, Boston, MA

International: N/A

Mentoring

Predoctoral Advisees / Mentees:

- 2007-2014 Anand Narayan MD PhD, medical student, currently radiology fellow at the Johns Hopkins University School of Medicine (Original research publications 26, 48, 56, 64)
- 2014-2017 Anthony Serritella, medical student, currently a 4th year medical student at the Johns Hopkins University School of Medicine

Postdoctoral Advisees / Mentees:

- 2004-2007 David E. Gerber MD, Hematology/Oncology fellow, currently associate professor, Medicine, University of Texas Southwestern, Dallas TX, co-directs the experimental therapeutics program (Original research publications 22 and 27; review article 7)
- 2004-2007 Christine Hann MD, PhD, Hematology/Oncology Fellow, currently assistant professor of Oncology, Johns Hopkins Kimmel Comprehensive Cancer Center (Review article 6, Book chapters 10 and 15)
- 2007-2010 Huichun Zhan MD, Hematology/Oncology fellow, currently hematologist/oncologist, James J Peters VA in New York (Original research publication 31 and case report 8)
- 2007-2010 Ashkan Emadi MD PhD, Hematology/Oncology fellow, currently associate professor, Medicine, University of Maryland (Review articles 13, 14; Case Report 5, Book Chapter 19)
- 2009-2012 Rakhi Naik MD MHS, Hematology/Oncology fellow, currently assistant professor, Medicine, Johns Hopkins University School of Medicine (Original research 53, 69, 86; Review article 19)
- 2009-2011 Kimberly L Carter, PharmD, ambulatory care pharmacy resident, Johns Hopkins Hospital, currently Assistant Professor of Pharmacy Practice, Thomas Jefferson University, Philadelphia, PA (Original research 46)
- 2011-2013 Matthew J. Newman, PharmD, pharmacy resident, Johns Hopkins Hospital, Oncology Clinical Pharmacist, Johns Hopkins Hospital (Original research 60)
- 2011-2013 Adrian Wong, PharmD, pharmacy resident, Johns Hopkins Hospital, currently Fellow, Outcomes Research and Pharmacy Informatics, Division of General Internal Medicine and Primary Care Brigham and Women's Hospital, Boston, Massachusetts (Original research 71)
- 2011-2013 Martin J. Bishop, PharmD, ambulatory care pharmacy resident, Johns Hopkins Hospital, currently Clinical Pharmacy Specialist, Ambulatory Care, Johns Hopkins Hospital (Original research 59, 89)
- 2010-2013 Amer Zeidan MBBS, MHS, Hematology/Oncology fellow, currently assistant professor, Medicine, Yale New Haven Conn (Original research 55, 65, 70, and 82; Review article 15, 22 and 23)
- 2013-2014 Jonathan Webster MD, medical resident, currently medical oncology fellow, Johns Hopkins University School of Medicine (Original research 66).

Thesis Committees

2009	Anand Narayan, MD PhD, dissertation committee member
2010	Adam Cuker, MD, MSTR, U Penn, thesis committee member
2011	Elliott Haut, MD, PhD, dissertation committee member
2014	Kimberly Steele, MD, PhD dissertation committee member

Educational Program Building/Leadership N/A

Educational Demonstration Activities to external audiences N/A

RESEARCH ACTIVITIES

Research Focus: My clinical research focus is prevention and treatment of venous thromboembolism. Within this area I have focused on identifying defects in VTE prevention and developing strategies to address these clinical care deficits. My work is described in more detail below in the System Innovation and Quality Improvement section.

Research Program Building/Leadership: None

Research Demonstration Activities: None

Inventions, Patents, Copyrights None

Technology Transfer Activities: None

SYSTEM INNOVATION AND QUALITY IMPROVEMENT ACTIVITIES

System Innovation Focus:

System Innovation and Quality Improvement efforts within JHM:

2003-Present Johns Hopkins Anticoagulation Management Service's contributions to improved anticoagulation management at the Johns Hopkins Hospital and Johns Hopkins Medicine

Since the Anticoagulation Management service was founded in 2003, we have promoted evidence- based anticoagulation management for Johns Hopkins inpatients and outpatients. We developed evidence-based guidelines for outpatient management of warfarin and low molecular weight heparin as well as the perioperative management of anticoagulation based upon the American College of Chest Physician Guidelines that we have used for our clinic. In 2008 our service played an important role in reviewing and updating Johns Hopkins Hospital Anticoagulation policies for unfractionated heparin, low molecular weight heparin and warfarin in response to Joint Commission's 2008 National Patient Safety Goals for Anticoagulation Management. I chair the Anticoagulation Task Force steering committee that meets quarterly. In addition, AC service team members Jessica Wellman PharmD and Patricia Ross PharmD organized a pharmacist-driven inpatient anticoagulation consult service that resulted in improved patient care and provider satisfaction. (See reference 37 in Research Publications). Working with Dr. Petty, Dr. Karen King and critical care pharmacy providers, we have also spearheaded the development of emergent warfarin and new oral anticoagulant reversal pathways for life-threatening bleeding. In collaboration with Ken Shermock PharmD, PhD we participated in a quality improvement project focusing on different measures of the INR in our clinic. Ken's analysis identified important deficiencies in the point-of-care INR monitor we were using in the clinic, prompting a change in the INR monitor we used for patients. In addition, he developed a unique clinical decision-based analysis of comparative INR measures that we believe is superior to the conventional analytic approach to comparative measures. These anticoagulation management quality improvement projects led to a number of publications from members of the AC service. (Original Research references 28, 29, 32-34, 40, 43, 46, and 89)

2005-present Johns Hopkins Venous Thromboembolism (VTE) Collaborative, Co-Director

In 2005, Paula Biscup, PharmD and I joined Sean Berenholtz MD, PhD and Deb Hobson RN to form the Johns Hopkins Venous Thromboembolism Collaborative to improve Johns Hopkins Hospital's performance in VTE prevention. After holding a series of VTE workshops with providers in different departments, we developed paper risk stratification tool to help clinicians prescribe risk-appropriate VTE prophylaxis. With the advent of electronic order entry, we realized that our paper risk stratification tools were out of the clinical workflow and that we would have to integrate these tools into the electronic order entry system. With Dr. Elliott Haut, Paula (and later Peg Kraus PharmD), Deb and I developed 16 different computer decision support "smart order sets" in conjunction with providers in each of these specialties. These order sets have facilitated significant improvements in VTE prevention at the Johns Hopkins Hospital. Since implementation of the order sets, VTE risk stratification in the Department of Medicine has been consistently above 96% since 2008 and risk appropriate prophylaxis ordering has been consistently above 90% since October of 2010. In conjunction with Murali Padmanaban and Kunal Dukle we developed VTE prophylaxis performance reports that allowed for data-driven improvements that have contributed to Johns Hopkins' consistent and excellent performance on VTE Core Measures and Meaningful Use measures. We have built a multidisciplinary team (including trauma surgeon Elliott Haut, ICU nurses Deb Hobson and Dauryne Shaffer, pharmacist Peg Kraus, medical informatics expert Brandyn Lau as well as statistician Victor Popoola) that has resulted in significant improvements in VTE management at The Johns Hopkins Hospital and 34 publications. (Original Research publications 42, 44, 52, 54, 55, 60, 61, 63, 70, 73, 77, 79, 81, 84, 88, 91, 92, 93; Review articles 18, 24, 30; Guidelines 3, 6, 7, 9-18; and other media 2, 6, 9, 11, 13-15, 17-22, 24, 25). At Johns Hopkins, we demonstrated that one third of all hospital-acquired deep venous thromboses were related to upper extremity central venous catheters and were not preventable with conventional pharmacologic VTE prophylaxis. Our clinical expertise on VTE management resulted in 3M and the Maryland HealthCare Cost Review Commission removing thrombosed aneurysms and upper extremity venous thrombosis from the list of Maryland Hospital Acquired Conditions (MHACs) which has resulted in substantial savings to Johns Hopkins Hospital and other institutions in the state. Our Johns Hopkins VTE Collaborative has been awarded the DVTeam Award by the North American Thrombosis Forum in 2010 and the Healthcare-Associated VTE Challenge Champion by the Centers for Disease Control and Prevention in 2015 (Review Article 30). I have given Grand Rounds locally as well as nationally and internationally on the topic of VTE prevention and management including lectures at the CDC, the American Society of Hematology annual meeting, the National Comprehensive Cancer Network annual meeting and in Saudi Arabia and United Arab Emirates.

System Innovation and Quality Improvement Efforts outside JHMI:

2014-2016 Joint Commission VTE Prevention Improvement Project, team member
 Laura Winner, Rich Hill and I are participating as Johns Hopkins Medicine's representatives in a Joint Commission sponsored VTE Prevention Improvement project that includes 4 other institutions including Massachusetts General Hospital, The Cleveland Clinic, Texas Health Resources and Kaiser Permanente. The goal of the project is to share innovations and develop new approaches to improve VTE prevention at the participating institutions. This project is ongoing.

Production of guidelines and/or protocols:

2006 British Committee for Standards in Haematology Guideline on the Use of Vena Cava Filters, co-author, no funding support, adopted by the British Committee for Standards in Haematology, has yet to be updated
 2006 Society for Interventional Radiology Guidelines for the Use of Retrievable and Convertible Vena Cava Filters, co-author, no funding support, adopted by the Society for Interventional Radiology, has not been updated
 2006-present National Comprehensive Cancer Network Venous Thromboembolism Guideline, member of writing committee since 2006, chairman of guideline committee since 2009, adopted by the NCCN members institutions, updated annually
 2011-13 International Clinical Practice Guidelines for Management of Venous Thromboembolism in Cancer Patients, co-author, funded and adopted by French National Institute on Cancer, active

System Innovation and Quality Improvement Program Building/Leadership

2003-present Johns Hopkins Anticoagulation Management service and Outpatient Clinics, Medical Director (additional description of innovations above)

2005-present Johns Hopkins VTE Collaborative, Co-Director (additional description of innovations above)

ORGANIZATIONAL ACTIVITIES

Institutional Administrative Appointments:

1999-2001	Member, Clinician Educator Subcommittee
2004-present	Member, DOM Clinical Operations Committee
2004-present	Member, DOM Patient Safety Committee
2008-present	Member and Chairman, Anticoagulation Task Force Steering Committee
2009-present	Member, DOM Ongoing Professional Performance Evaluation Committee
2010	Member, DOM Divisional Salary Review Committee

Editorial Activities:

Editorial Board Appointments - None

Journal Peer Review Activities:

2006-present	Urology
2007-present	Acta Haematologica
2007-present	Annals of Internal Medicine
2007-present	Blood
2007-present	Medicine
2007-present	Ophthalmology
2007-present	Transfusion
2008-present	Journal of National Comprehensive Cancer network
2008-present	New England Journal of Medicine
2009-present	Blood Coagulation and Fibrinolysis
2009-present	Cleveland Clinic Journal of Medicine
2009-present	Haematologica
2010-present	American Journal of Medicine
2010-present	Journal of General Internal Medicine
2010-present	Journal of Thrombosis and Haemostasis
2010-present	Journal of Vascular and Interventional Radiology
2011-present	British Journal of Urology
2011-present	British Medical Journal (BMJ)
2011-present	Expert Reviews in Cardiovascular Therapy
2011-present	Journal of Thrombosis and Thrombolysis
2011-present	Thrombosis and Haemostasis,
2012-present	Journal of Hospital Medicine
2012-present	Thrombosis Research
2013-present	Chest
2013-present	Journal of Clinical Oncology
2014-present	Haemophilia
2014-present	Lancet
2015-present	JAMA Internal Medicine

Other peer review activities:

Advisory Committees, Review Groups/Study Sections:

2005-present	Member, Venous Thromboembolism Guidelines Committee, National Comprehensive Cancer Network
2005	Teleconference Review Group Member of PIOPED III Program Project grant, NIH
2010	Consultant, U.S. Medical Eligibility Criteria for Contraceptive Use, Centers for Disease

	Control and Prevention
2010	Member, International Practice Guideline Committee on Management of Cancer-associated Venous Thromboembolism Chairmen- Harry Buller and Dominique Farge
2013-present	Member, Medical and Scientific Advisory Board, National Blood Clot Alliance
2013-present	Board Member, Anticoagulation Forum

Professional Societies

1992-present	Member, American College of Physicians
1995-present	Member, American Society of Hematology
1995-present	Member, International Society of Thrombosis and Haemostasis
2005-present	Member, Anticoagulation Forum
2010-present	Fellow, American College of Physicians

Conference Organizer

<i>JHMI/Regional:</i>	2009-present	Johns Hopkins DVT Awareness Month Symposium
<i>National:</i>	None	
<i>International:</i>	None	

Session Chair

<i>JHMI/Regional:</i>	None
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National:

06/09	Outcomes Research II Session Co-Chair with Clive Kearon, ISTH, Boston MA
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<i>International:</i>	None
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Consultantships

2006-2007	Sanofi-Aventis
2006-2007	Eisai
2011	Sanofi-Aventis
2011-2013	Eisai DalteCan Data Safety Monitor Board
2013-present	Bio2Medical Angel Filter Data safety Monitoring Board
2014-	Janssen Calisto Cancer VTE Clinical Trials Portfolio, consultant
2014-present	American Society of Hematology Consult-a-Colleague program
2015-	Janssen Atrial Fibrillation Patient Care Improvement Project
2015-	CSL Behring, Data safety monitoring board

RECOGNITION

Awards, Honors:

1983	Valedictorian, Summa Cum Laude, Washington and Lee University, Lexington VA
1983-1984	Fulbright Scholar at University of Ulm, West Germany, United States Department of State, Bureau of Educational and Cultural Affairs
1991	Leighton R. Cluff Award for the Most Exemplary Physician, University of Florida
1994	William R. Bell Prize in Hematology, Johns Hopkins University School of Medicine, Department of Medicine, Division of Hematology
1995	ASCO Young Investigator Award, American Society of Oncology
1996	C. Lockard Conley Award in Hematology, Johns Hopkins University School of Medicine
2006	Osler Medical House staff Award for Outstanding Teaching by a Full-time Faculty Member
2010	Osler Medical House staff Award for Outstanding Teaching by a Full-time Faculty Member
2010	North American Thrombosis Forum Award Winner for best VTE Prophylaxis system (Hospitals > 200 beds)

2015	Centers for Disease Control and Prevention Healthcare-associated Venous Thromboembolism Prevention Challenge Champion- Awardee- Johns Hopkins VTE Collaborative
2016	Mary Betty Stevens Award for Clinical Research, Maryland Chapter of the American College of Physicians

Invited Talks, Panels

JHMI/Regional:

- 1997-present Lecturer, Post-doctoral fellows and faculty, Hematology Grand Rounds, The Johns Hopkins University School of Medicine, Baltimore, MD
- 1999-present Lecturer, Medical students, residents, post-doctoral fellows and faculty, Department of Medicine Grand Rounds, The Johns Hopkins University School of Medicine, Baltimore, MD
- 1999, 2000, 2002, 2006, 2009, 2011
Lecturer, Medical students, residents, attending staff, Harbor Hospital Center Medical Grand Rounds, Harbor Hospital Medical Center, Baltimore, MD
- 1999-2001 Lecturer, community physicians and faculty, Saturday Medicine Rounds at The Johns Hopkins Hospital, The Johns Hopkins University School of Medicine, Baltimore, MD
- 1999 Lecturer, Residents and staff physicians, Montgomery General Hospital Medical Grand Rounds, Olney MD
- 2000, 2011, 2013
Lecturer, Residents and staff physicians, St. Agnes Hospital Medical Grand Rounds, St. Agnes Hospital, Baltimore MD
- 2001, 2006, 2011, 2016
Lecturer, Residents and staff physicians, Union Memorial Hospital Medical Grand Rounds, Union Memorial Hospital, Baltimore, MD
- 2003, 2005 Lecturer, Residents and faculty, Johns Hopkins OB/Gyn Department Grand Rounds
- 2004-2006 Lecturer, Attendees, New Approaches to Brain Tumor Therapy Consortium Spring Meeting, Baltimore MD
- 2004, 2009, 2015
Lecturer, Residents post-doctoral fellows and faculty, Department of Urology Grand Rounds, Johns Hopkins Hospital, Baltimore, MD
- 2005 Lecturer, Residents and staff physicians, Prince George's Hospital Center Medical Grand Rounds, Cheverly MD
- 2005 Lecturer, Community genetic medicine physicians and allied health professionals, Baltimore Genetics Society Annual Conference, Greater Baltimore Medical Center, Baltimore, MD
- 2005, 2009, 2013
Lecturer, Residents, post-doctoral fellows and faculty, Department of Neurosurgery Grand Rounds, Johns Hopkins Hospital, Baltimore, MD
- 2005, 2006, 2013, 2016
Lecturer, Residents and staff physicians, Mercy Medical Center Medical Grand Rounds, Baltimore, MD
- 2005 Lecturer, Residents and staff physicians and allied health professionals, Department of Emergency Medicine Grand Rounds, St Agnes Hospital, Baltimore, MD
- 2006 Lecturer, Residents and staff physicians, Sibley Hospital Department of Anesthesia Rounds, Sibley Hospital, Washington, DC
- 2006 Lecturer, Members of the National Medical Association-Maryland Chapter, National Medical Association Annual Meeting, Baltimore, MD
- 2006, 2014 Lecturer, Residents and staff physicians, Good Samaritan Hospital Medical Grand Rounds, Baltimore, MD
- 2006 Lecturer, Residents, post-doctoral fellows and faculty, Georgetown University Hospital Hematology/Oncology Grand Rounds, Georgetown University, Lombardi Cancer Center, Washington DC
- 2007 Lecturer, Residents, post-doctoral fellows and faculty, West Virginia University Hematology

Oncology Grand Rounds, Robert C. Byrd Health Sciences Center, Martinsburg, WV
 2007 Lecturer, Residents and staff physicians, Union Medical Center Grand Rounds, Clarksburg, WV
 2008 Lecturer, Residents and staff physicians, Mt Nittany Medical Center Medical Grand Rounds, Mt Nittany Medical Center, Pennsylvania State University, State College, PA
 2008 Lecturer, Residents, post-doctoral fellows and faculty, Johns Hopkins Division of Nephrology Renal Grand Rounds, Johns Hopkins Hospital, Baltimore, MD
 2008 Lecturer, Residents and staff physicians, Frederick Memorial Hospital Medical Grand Rounds, Frederick Memorial Hospital, Frederick, MD
 2008 Lecturer, Pharmacy students, residents and staff pharmacists, Department of Pharmacy Grand Rounds, Johns Hopkins Hospital, Baltimore, MD
 2008 Lecturer, Residents and staff physicians and allied health professionals, VTE Symposium, Lankenau Hospital, Philadelphia PA
 2009 Discussant/Moderator, Physician and allied health professional staff of the Region III MidAtlantic Comprehensive Hemophilia Centers, Region III Hemophilia Meeting, Alexandria, VA
 2009 Lecturer, Pharmacist members of the Maryland Health Systems Pharmacy Association, Maryland Health Systems Pharmacy Association Annual Meeting, Maritime Institute, Linthicum Heights MD
 2010 Lecturer, Residents and staff physicians and allied health professionals, Lankenau Hospital Medical Grand Rounds- Lankenau Hospital, Philadelphia PA
 2010 Lecturer, Residents, post-doctoral fellows and faculty, Johns Hopkins Department of Pathology Grand Rounds- Johns Hopkins Hospital, Baltimore, MD
 2010 Lecturer, Physicians, nurses and pharmacists in Quality Improvement, Delmarva Foundation Webinar
 2011 Lecturer, Residents, post-doctoral fellows and faculty, Johns Hopkins Bayview Department of Medicine Grand Rounds, Baltimore, MD
 2011 Moderator, Physician, nurse and pharmacist members of the North American Thrombosis Forum, North American Thrombosis Forum Awards Ceremony, Boston MA
 2011 Lecturer, Residents and staff physicians and allied health professionals Medical Grand Rounds- Suburban Hospital, Bethesda, MD
 2011 Lecturer, Residents, post-doctoral fellows and faculty, Maternal-Fetal Medicine Grand Rounds, John Hopkins Hospital, Baltimore, MD
 2011 Lecturer, Residents, post-doctoral fellows and faculty, Department of Anesthesia and Critical Care Medicine Grand Rounds, Johns Hopkins Hospital Baltimore, MD
 2012 Lecturer, Residents and staff physicians and allied health professionals, Greater Baltimore Medical Center Joint Medical Surgical Grand Rounds, Baltimore, MD
 2012 Lecturer, Residents and staff physicians and allied health professionals, Venous Thromboembolism: the difficult questions 2012- Lankenau Medical Center, Philadelphia PA
 2013 Lecturer, Maryland physician members of the Maryland Society of Hospital Medicine, Maryland Society of Hospital Medicine, Hospital Medicine Day Howard County General Hospital Columbia MD
 2013 Lecturer, Post-doctoral fellows and faculty, Johns Hopkins Hematologic Malignancies Course, Johns Hopkins Hospital, Baltimore, MD
 2013 Lecturer, Physicians, Nurses and pharmacists involved in Quality Improvement, Johns Hopkins Patient Safety Summit, Johns Hopkins Medical Institutions, Baltimore, MD
 2013 Lecturer, Post-doctoral fellows and faculty, Johns Hopkins Oncology Grand Rounds, Johns Hopkins University School of Medicine, Baltimore, MD
 2014 Lecturer, Residents, post-doctoral fellows and faculty University of MD Hematology Oncology Grand Rounds, University of MD, Baltimore, MD
 2014 Lecturer, Residents and staff physicians and allied health professionals Anne Arundel Medical Center Grand Rounds, Annapolis MD
 2014 Lecturer, Residents and staff physicians, Washington Hospital Center Medical Grand Rounds, Washington DC
 2015 Lecturer, Residents and staff physicians, Greater Baltimore Medical Center Oral and Maxillofacial Surgery Conference, Greater Baltimore Medical Center Baltimore. MD
 2016 Lecturer, Residents and staff physicians, Atkins Memorial Lecture, York Hospital, York PA

- 2016 Lecturer, Conference Attendees, "Perioperative Management of Anticoagulation"- 2nd Topics in Craniomaxillofacial Surgery- Johns Hopkins Hospital, Baltimore, MD 11-5-16
 2016 Lecturer, Faculty and House staff, Johns Hopkins Bayview Medical Grand Rounds, "Prevention of Venous Thromboembolism, Johns Hopkins Bayview Medical Center, Baltimore, MD

National:

- 2003 Invited Lecturer, Residents, staff and community physicians, 20th Annual Allan Zieger Symposium, Issues in Hematology/Oncology, sponsored by Botsford General Hospital at Detroit Novi Sheraton, Detroit, Michigan
 2005 Invited Lecturer and panel discussant, Members of the Society of Interventional Radiology, Society of Interventional Radiology Annual Meeting Consensus Conference on Vena Cava Filters, Miami, FL
 2005 Keynote Lecturer, Physician Members of the Western New York Vascular Society, 7th Annual Meeting of the Western New York Vascular Society, Buffalo, NY
 2006 Lecturer, Residents, post-doctoral fellows and faculty, University of Florida Hematology Grand Rounds, Shands Hospital at The University of Florida, Gainesville, FL
 2006, 2010, 2016 Lecturer, Post-doctoral fellows and faculty members of the National Comprehensive Cancer Network, National Comprehensive Cancer Network Annual Meeting, Ft. Lauderdale, FL
 2006 Lecturer, Post-doctoral fellows and faculty members of the National Comprehensive Cancer Network NCCN Annual Quality Improvement Meeting, New York City, New York
 2006 Lecturer, Physician members of the Cardiothoracic Surgical Critical Care Society, Cardiothoracic Surgical Critical Care Annual Meeting, Washington DC
 2007 Lecturer, Members of the Society of Interventional Radiology, Society of Interventional Radiology Research Conference, Washington, DC
 2007 Lecturer, Residents, post-doctoral fellows and faculty, Hematology/Oncology Grand Rounds, Yale New Haven Hospital, Yale University School of Medicine, New Haven, Conn
 2007 Lecturer, Members of the Society of Interventional Radiology Society of Interventional Radiology Research Conference, Miami, FL
 2008 Lecturer, Attendees at the Medbiquitous meeting, Improvements in VTE prophylaxis with an electronic order set- Medbiquitous Convention 2008, Baltimore, MD
 2008 Lecturer, Members of the NCCN VTE Guideline Committee, NCCN VTE Guideline Consensus Conference, Philadelphia PA
 2008 Lecturer, Physician attendees at the American Society of Clinical Oncology Meeting, Diagnosis and Initial Treatment of Venous Thromboembolism, American Society of Oncology Categorical Course, Chicago, IL
 2009 Lecturer, Staff and invited faculty, CDC meeting on US Medical Eligibility Criteria for Contraceptive Use, Centers for Disease Control and Prevention, Atlanta, GA
 2010 Lecturer, Members of the Society of Hospital Medicine, Society of Hospital Medicine Annual Meeting, Chicago, IL
 2010 Lecturer/Awardee, Members of the North American Thrombosis Forum, VTE Prevention using an electronic "Smart Order set" – Award Ceremony for the DVTeam Award for the best innovation in DVT Prevention from a large hospital (> 200 Beds) North American Thrombosis Forum Meeting, Boston, Massachusetts
 2010 Lecturer, Online attendees, Webinar series by American Association of Blood Banks,
 2010 Lecturer, On-line attendees, University Healthsystem Consortium webinar
 2010 Lecturer, Residents and faculty of the University of Rochester and invited faculty, Cancer and Thrombosis Symposium- University of Rochester, Rochester, NY
 2010 Lecturer, Attendees at the UHC Annual Meeting, University Health System Consortium National Meeting, San Diego CA
 2010 Lecturer, Post-doctoral fellows and faculty members of the National Comprehensive Cancer Network, NCCN Hematologic Malignancies Annual Congress, NYC, NY
 2010 Lecturer, Attendees, Pri-Med Conference, Baltimore, MD
 2010 Lecturer, Attendees, National Managed Care Forum- Las Vegas, NV

2010 Lecturer, Members of the Miami OB/GYN society, Miami OB/Gyn Society, Miami, FL
 2011 Lecturer, Physician, nurse and pharmacist members of the Anticoagulation Forum 11th Annual Anticoagulation Forum, Boston MA
 2011 Lecturer, Residents, faculty and allied health professionals, Carolinas Med Center and Mecklenburg Medical Group 4th Annual VTE Conference- Charlotte, NC (2 lectures)
 2011 Lecturer, Residents, post-doctoral fellows and faculty, University of Miami Hematology Grand Rounds, University of Miami, Miami, FL
 2011 Lecturer, Attendees at the American Society of Hematology Annual Meeting, Consultative Hematology Course at the American Society of Hematology Annual meeting, San Diego CA
 2012 Lecturer, Physician, Nurse and Pharmacist attendees, "Blood-in-Motion® Conference University of Pittsburgh, Pittsburgh, PA
 2012 Lecturer, Members attending the MASCC/ISOO Annual meeting, Multinational Association of Supportive Care in Cancer MASCC/International Society of Oral Oncology Annual Meeting, New York NY
 2012 Lecturer, residents, and staff physicians, St Luke's Hospital Update in Hematology Conference-St Louis MO
 2012 Lecturer, Post-doctoral fellows and faculty members of the National Comprehensive Cancer Network, National Comprehensive Cancer Network 7th Annual Congress on Hematologic Malignancies- NYC, NY
 2012 Lecturer, Members attending the American College of Chest Physicians Annual Meeting, Chest Conference, American College of Chest Physicians Annual Meeting, Atlanta GA
 2012 Lecturer, Attendees at the American Society of Hematology meeting, American Society of Hematology Annual Meeting Education Program, Atlanta GA
 2012 Lecturer, Attendees at the American Society of Hematology meeting, American Society of Hematology Annual Meeting Special Symposium on Patient Safety Initiatives Atlanta GA
 2013 Lecturer, Members of the Society of Hospital Medicine, Society of Hospital Medicine Annual Meeting, National Harbor, MD (2 lectures)
 2013 Lecturer, Residents, post-doctoral fellows and staff, St Luke's Hospital Hemostasis Conference, St Lukes Hospital St. Louis MO
 2013 Lecturer, Staff at the Centers for Disease Control and Prevention, Centers for Disease Control and Prevention Public Health Grand Rounds, Centers for Disease Control- Atlanta GA
 2013 Lecturer, Residents, faculty and allied health professionals, 6th Annual Venous Thromboembolism Conference at Carolinas Levine Medical Center- Charlotte NC (2 lectures)
 2013 Lecturer, Pharmacist members of the American Society of Health System Pharmacists, American Society of Health System Pharmacists National Meeting- Orlando FL
 2013 Lecturer, Members of the Duke Clinical Research Institute and invited guests, Duke Clinical Research Institute, Ritz Carlton Tyson's Corner VA
 2013 Lecturer, Staff at VHA facilities, VHA, Inc. "Partnership for Patients education series television program on "Venous Thromboembolism prophylaxis" VHA Inc., Headquarters Irving TX
 2013 Lecturer, Physician members, Rocky Mountain Oncology Society Meeting- Denver CO
 2014 Lecturer, Residents, post-doctoral fellows and faculty, University of Iowa DeGowin Memorial Lecture, Iowa City Iowa
 2014 Lecturer, Residents, physician staff, allied health professionals, AC Forum sponsored education program at Mount Carmel East Hospital Columbus, Ohio
 2014 Lecturer, Residents, post-doctoral fellows and faculty, Memorial Sloan Kettering Hematology Oncology Grand Rounds, NYC NY
 2014 Lecturer, Post-doctoral fellows at NCCN institutions, Post-doctoral Fellows Educational Meeting at the NCCN Annual Conference. Hollywood FL
 2014 Lecturer, Attendees at the American Society of Clinical Oncology Annual Meeting, Hematology for the Oncologist- American Society of Clinical Oncology Special Session, American Society of Oncology Annual Meeting, Chicago, IL

2014 Lecturer, Attendees, Premier Healthcare Alliance webinar
 2014 Lecturer, Attendees of meeting as well as staff, residents, fellows, MD Anderson Conference on Cancer and the Heart, MD Anderson Cancer Center- Houston TX
 2015 Lecturer, Attendees at annual meeting, Society of Hospital Medicine Annual meeting, National Harbor, MD
 2015 Lecturer, Attendees, Centers for Disease Control Clinical Immunization Safety Assessment Annual Meeting, Atlanta GA- via webinar
 2015 Lecturer, Attendees at annual meeting, Society for Cardiovascular Anesthesiologists Annual Meeting, Washington DC
 2015 Lecturer, Attendees to Annual Meeting including physicians, nurses, pharmacists, 20th Annual Anticoagulation Forum Annual Meeting, Washington DC (2 lectures)
 2015 Lecturer, Attendees of ACC meeting, American College of Cardiology Anticoagulation Consortium, Heart House, Washington DC
 2015 Lecturer, 30th Annual Pharmacy Invitational Conference on Antithrombotic Therapy (PICAT), Astor Crowne Plaza Hotel in New Orleans, LA. (2 lectures)
 2016 Lecturer, Attendees of meeting, Food and Drug Administration Conference on Point-of-Care INR devices: Clinician Perspective Silver Spring MD
 2016 Lecturer, Conference attendees, Massachusetts General Hospital Symposium on Hematology and Oncology, "Management of Difficult Problems in Hemostasis and Thrombosis" Boston MA
 2016 Lecturer, ACP Annual meeting attendees, American College of Physicians Annual Meeting, Washington DC
 2016 Lecturer, Conference attendees, "DOACs should not be used in Cancer Patients", American Heart Association Meeting, New Orleans, LA
 2016 Lecturer, Attendees at the American Society of Hematology meeting, Cancer and Thrombosis, American Society of Hematology Annual Meeting Education Program, San Diego CA (2 lectures)
 2016 Lecturer, Attendees at the American Society of Hematology meeting, "Safety of different anticoagulants for the treatment of venous thromboembolism in patients with cancer", American Society of Hematology Annual Meeting, San Diego CA

International:

2006 Lecturer, Conference attendees, Swiss Society of Hematology Hemostasis Annual Meeting, Invited Speaker, University of Zurich, Zurich, Switzerland
 2007 Lecturer, Conference attendees 4th International Conference on Thrombosis and Hemostasis Issues in Cancer, Bergamo, Italy
 2010 Lecturer, Conference attendees, 9th Annual Brazil Conference on HIV/AIDS, Rio De Janeiro, Brazil
 2010 Lecturer, Conference attendees, International Summit on Thrombosis and Hemostasis in Cancer, Stresa on Lake Maggiore Italy

Other Professional Accomplishments

2009, 2011-2016 Baltimore Magazine Top Doctors
 2012-2016 America's Top Doctors, Castle Connolly